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The Mexican Leafhoppers of the Genera *Cloanthanus* and *Scaphytopius* (Homoptera-Cicadellidae)

DWIGHT M. DeLONG

(Dept. of Zoology and Entomology, Ohio State University, Columbus, Ohio)

During the past few years the writer has had an opportunity to make two trips into Mexico for field study and to make extensive collections, in certain areas, of material in the Homoptera. Several who were associated with the writer during these trips have assisted in the field collecting. A considerable amount of material has also been obtained from Dr. Dampf and his associates and from Dr. C. C. Plummer and Mr. W. E. Stone, both associated with the United States Department of Agriculture and Plant Quarantine, and located in Mexico City. A study of the material has revealed 49 species, one in *Scaphytopius* and 48 which have been placed in *Cloanthanus*. Of this group 36 are apparently undescribed. All species previously described from Mexico have been examined except six which were described from material collected only on the Islands in the Gulf of California. During this study, type material of all the species described from the southwestern United States has been examined and the genital structures dissected and studied in detail. The male structures of the genital chamber, often referred to as the internal genitalia, have not previously been illustrated nor published for species of this group and until recently very little work has been performed to ascertain their value for species separation. The illustrations for all of the available Mexican species and a few of the southwestern species which undoubtedly occur in Mexico are included at this time.

The male genital structures are quite different in type in the various species or groups of the genus *Cloanthanus*. The more common general type is an aedeagus with an upper and lower portion, the latter composed of a pair of long structures, slender or blade-like which extend from the connectives near the base to the apex of the pygofer. Other aedeagi are single structures without paired ventral processes and may be simple in type or complicated structures.

Externally the length and type of vertex will vary greatly. Certain spe-

cies have a long slender pointed vertex. In others the vertex is very short and blunt. This structure has previously been used as a major character to show the relationship of the species of the genus, but there is no correlation of length of vertex with the type of genitalia. The length of the vertex of the male is often shorter than the female of the same species. It has been observed for instance that similar types of genital structures may be found in species very different in external appearance. On the other hand species very similar in appearance externally may have entirely different types of male genital structures. For this reason it is difficult to correctly



Fig. 1. Map of Mexico showing the biotic provinces as described by Hobart Smith. The heavily "beaded" line is the approximate division between the Nearctic and Neotropical regions.

determine the affinities of this group. It is the opinion of the author that in most cases the genital structures are a good index to the relationship of species. The color of the face is also a good character for the separation of species but it is of little value as a criterion for determining relationship.

The geographical distribution and ecological portion of the study is very interesting, but quite complicated. The merging of the boundaries of the Nearctic and Neotropical regions occurs in Mexico, and these boundaries are naturally not sharply defined. An attempt to define these regions is further complicated by the irregular topography which includes several high rugged mountain ranges. In spite of this fact, several students have attempted to name distributional provinces for fauna and flora. These areas have varied greatly with different authors and different types of

biological problems. A recent publication concerning these regions was written by Hobart M. Smith,* who has constructed a map of the regions and biotic provinces of Mexico as indicated by the distribution of the Lizards of the Genus *Sceloporus*. Since so much detailed material has been used to construct this map, it will be used as a basis for a discussion of the species of *Cloanthanus*, although the two types of animals are widely separated and the habits and ecology of the lizards are quite different from the plant feeding leafhoppers.

The distributional patterns of the species of *Cloanthanus* do not seem to fit into this scheme of provinces, but certain available data, although they are incomplete, might be given regarding the distribution of some of these. *Cloanthanus nitridus* DeL., is a species which is apparently widely distributed throughout the Nearctic and Neotropical regions. It has been taken at sea level in both the Gulf area and on the Pacific in the State of Guerrero and at an altitude of 10,000 feet in the state of Mexico. *C. fuliginosus* (Osborn) is for the most part a low altitude, neotropical species but also occurs in the Nearctic area up to an elevation of 7500 feet in the state of Mexico. Most of the species have not proven to be so common and widely distributed as the two mentioned above. *C. nanus* (V.D.), *C. apertus* DeL., *C. caldwelli* DeL., *C. alas* var. *parvalas* DeL., and *C. albocephalus* DeL., have been found only in the Veracruzian Province of the Neotropical on the eastern side of Mexico and are associated with the monsoon forest vegetational areas at low altitudes. Three other species, *C. brevis* (V.D.), *C. osborni* (V.D.), and *C. lineafrons* DeL., are also found in the same Province, but in addition have been taken in the Lower Balsan of the Neotropical on the western Pacific area of Guerrero at about the same altitude. *C. albomarginatus* DeL., *C. limbramentus* DeL., *C. vinculus* DeL., *C. goodi* DeL., *C. albocinctus* DeL., and *C. plummeri* DeL., all are apparently Lower Balsan species of the neotropical and occur only on the Pacific (western and southern) side of the divide at rather low altitudes according to the records at hand. *C. flavens* DeL. seems to be distributed in the Lower Balsan of the neotropical and Upper Balsan of the nearctic. Records are at hand from both areas showing a range in altitude of 600 to 5500 feet.

Several species, *C. hebatus* DeL. (5000), *C. parallelus* DeL. (8000), *C. campester* DeL. (7500), *C. spadix* DeL. (5000), and *C. fluxus* DeL. (4500-6500) have been collected only in the Austro-central Province of the Nearctic at altitudes ranging from 4500 to 8000 feet. *C. marginifrons* has been collected in this Province and also in the Hidalgo, another Nearctic Province, at 5000 feet elevation. *C. atrafrons* DeL. has been found in both the Austro-central and the Upper Balsan of the Nearctic at elevations

* Smith, H. M., Biotic Provinces of Mexico. Anal. Escu. Nac. de Cien. Biol. 2: 95-110, 1940.

ranging from 5000 to 8200 feet. *C. heldoranus* (Ball) has been collected only in the Hidalgo of the Nearctic at 5000 feet elevation. *C. vermiculatus* DeL. and *C. duocolorus* DeL. have been found only in the Austro-occidental (Nearctic) at elevations of 4000 to 9200 feet. *C. subniger* DeL. has been taken only in the Tamaulipan Province (Nearctic) at elevations ranging from 300 to 5000 feet. *C. irroratus* while occurring only in the Nearctic has been found in the Tamaulipan, Chihuahuan, Austro-oriental, Hidalgo and Chiapan Plateau Provinces. It varies in elevation from sea level to about 1700 feet. Three other species are more widely distributed in both Nearctic and Neotropical regions. *C. tripunctatus* DeL. has been found in the Upper Balsan and Austro-central Provinces of the Nearctic and the Veracruzian and Peten Provinces of the Neotropical. Its range in elevation is from 200 feet in the low monsoon forest area to about 6500 feet in the Austro-central Province at Zitacuara, Mich. *C. stonei* has been collected in the Austro-central and Austro-occidental Provinces of the Nearctic region and the Lower Balsan and Veracruzian Provinces of the Neotropical region. It has been collected at elevations ranging from about 3000 to 8000 feet. Records at hand for *C. lumenotus* DeL. show it to occur in the Hidalgo Province (Nearctic) and the Lower Balsan Province (Neotropical), where it ranges in elevation from 1600 feet to 5700 feet.

The only species found in Mexico which is placed in the Genus *Scaphytopius* is *elegans* (V.D.), which has been taken only at elevations ranging from 5000 to 6500 feet in the Upper Balsan, Austro-occidental and Tamaulipan Provinces of the Nearctic region.

It is apparent from these data, that the distribution of the lizards of the Genus *Sceloporus* does not coincide with the distribution of the leafhoppers which are apparently more closely correlated with plant distribution. Undoubtedly the basic factors which determine the distribution of plants and the distribution of the lizards are different.

All type specimens of species described in the following pages are in the personal collection of the author at Columbus, Ohio, unless otherwise designated.

KEY TO SPECIES OR GROUPS OF SPECIES OF *CLOANTHANUS***

- 1 Dark brown with a yellow vertex and a transverse yellow band across scutellum and base of elytra.....*cinctus*
- 1' Without a yellow transverse band on elytra.....2
- 2 Face with a longitudinal pale strip bordered with black, extending from near apex to clypeus.....*lineafrons, marginifrons, parallelus*
- 2' Face without longitudinal stripes.....3
- 3 Face uniformly pale yellow, bright yellow, green white or yellow bordered above with brown.....4
- 3' Face dark brown, gray, or pale irrorate with brown.....8
- 4 Face yellow, brown bordered above.....*pexatus, campester, duocolorus*

** The key is based upon the more prominent color patterns. A detailed key based upon male genitalia seems unnecessary since the illustrations of these characters are included.

- 4' Face uniformly yellow, green or white without brown border.....5
 5 Entire face and vertex white or pale yellow, pronotum and elytra black.....*albocephalus*
 5' Vertex not entirely white or yellowish.....6
 6 Face green, vertex green with black longitudinal markings.....*nigriviridis*
 6' Face some shade of yellow.....7
 7 Vertex usually black or dark brown with some pale markings.....
nitridus, serratus, nanus, subniger, apertus, tripunctatus, fuliginosus, parvalas, luteolus, acu-
minatus, hymenocleae, analis, aequinoctialis
 7' Vertex usually marked so as to appear banded with a series of pale lines forming a pale band
 before the eyes and another at base of vertex.....
latens, spadix, anademus, alas, vinculus, aequus, loricatus, irroratus, caldwelli, hebatus
 8 Face gray in color.....*flavens, piperatus, dodononius*
 8' Face appearing brown or pale sparsely irrorate with brown.....9
 9 Face dark brown or heavily irrorate with brown.....
atrafrons, fluxus, fusifrons, stonei, vermiculatus
 9' Face pale sparsely irrorate with black or brown.....10
 10 Green, vertex black or with anterior half black.....*nigricollis*
 10' Brown or black, vertex pale or some shade of brown.....11
 11 Vertex white only faintly marked.....12
 11' Vertex rather heavily marked appearing dark or with broad dark bands.....13
 12 Vertex white with a faint narrow orange band, scutellum pale, elytra black with white margins
 and white spots along commissural lines.....*albomarginatus*
 12' Vertex with a broader orange band, elytra brown with a transverse white band at middle..
albocinctus
 13 Vertex produced and sharp pointed.....*heldoramus, limbramentus*
 13' Vertex short and blunt.....
brevis, quinquenotus, lumenotus, falcatus, plummeri, goodi, osborni, speciosus, scutellatus

***Cloanthanus nanus* (V.D.)**

Platymetopius nanus Van Duzee Bul. Buf. Soc. Nat. Sci. 8: 65, 1907.

A blunt headed species resembling *frontalis* in color pattern but with distinct genitalia. Length 3.5-4 mm.

Vertex short and appearing almost rounded in male a little longer at middle than basal width between eyes; more produced and bluntly angled in female.

Color: Vertex black with a white spot at apex and a pair of spots either side between apex and eyes. Dorsal surface black except faint longitudinal lines on pronotum and pale costal margin interspersed with dark costal veinlets. Face pale yellow.

Genitalia: Female last ventral segment roundedly produced on posterior margin. Male plates rather long, triangular and with blunt apices. Styles with a thick finger-like process on inner margin at apex which curves outwardly. Aedeagus with a pair of ventral processes which are stout, straight, and constricted just before apex to form prominent tips. From the base of these paired processes an erect portion arises which is directed dorsally. From the middle of this erect portion arises a flat rather long caudally directed process which curves dorsally at apex and is two-thirds as long as the ventral processes.

A pair of specimens are at hand from Guadalajara, Jal., Mexico, Km. 645, elevation 5700 feet, collected from a mixture of second growth scrub

and herbaceous vegetation, October 3, 1941, by C. C. Plummer, J. C. Caldwell, E. E. Good and the author.

***Cloanthanus serratus* n. sp.**

In form and general appearance resembling a pale specimen of *frontalis*, genitalia similar to *nanus*. Length 3.5 mm.

Vertex produced and bluntly angled, about one-third longer at middle than basal width between eyes.

Color black, rather uniformly mottled with white. Vertex black with a spot at apex and a pair of longitudinal dashes either side between apex and eye, white. Pronotum with five longitudinal white lines. Scutellum with central third paler. Elytra with a mottled appearance, costal area pale with dark brown costal nervures. Face and eyes beneath entirely pale yellow.

Genitalia male plates elongate, triangular. Style with the apical finger-like process on the inner margin short, not more than one-fifth the length of style and strongly curved outwardly. Aedeagus with a pair of ventral processes which are about the length of the plates and notched on the ventral margin just before the apical spear-like tips. The dorsal portion has a basal process extending almost dorso-ventrally from which arises about half way on the posterior side a long slender process which extends caudally and is curved gradually dorsally.

Holotype male from Mexico without specific data.

***Cloanthanus aequus* n. sp.**

In form and general appearance resembling *serratus* to which it is closely related but more brownish in color less mottled, with a shorter vertex and distinct genitalia.

Vertex produced and bluntly angled, about one-fourth longer at middle than basal width between eyes.

Color dark brown, uniformly mottled with minute white flecks. Vertex brown with a median dash at apex and longitudinal dashes half way from apex to eye arranged obliquely toward disc which gives the appearance of a pale transverse band. Pronotum dark brown with only traces of longitudinal pale lines. Scutellum with white dashes marking off the basal angles. Elytra dark brown with several oblique white dashes along costal margin. Face and eyes beneath pale yellow.

Genitalia: Female last ventral segment with posterior margin slightly produced, almost truncate. Male plates rather short, triangular, apices blunt. Style with a short, apical finger-like process on inner margin which is strongly curved outwardly. Aedeagus with a basal portion which extends dorso-ventrally from which arises on the posterior margin a pair of short processes at the ventral end and a single process at about the middle. These appear to be about parallel and both curve dorsally.

Holotype male from Colima, Colima, Mexico, elevation 1600 feet, collected January 27, 1930 by Dr. Alfons Dampf. Allotype female from Chapingo, D. F., Mexico, collected May 30, 1924, and male and female paratypes from Chapingo, El Dorado, Sin., December 25, 1928, Moderos, Vera Cruz, Mexico, December 18, 1926, and several without specific data from Mexico.

***Cloanthanus latens* n. sp.**

In form and general appearance resembling *serratus* but with longer vertex and distinct genitalia. Length 4.5 mm.

Vertex produced and bluntly angled, more than one-third as long at middle as basal width between the eyes.

Color dark brown. Vertex with apical margin and a pair of spots either side between apex and eyes white. These almost form a transverse band before the eyes. The longitudinal pale lines on the pronotum are faint and the scutellum is dark brown scarcely marked. Elytra dark brown, with three small round spots on posterior margin of clavus. Costal area pale with dark costal veinlets. Face bright yellowish.

Genitalia: Female last ventral segment roundedly produced, apex black. Male plates triangular with blunt apices. Style with a short finger-like apical process on inner margin which is strongly curved outwardly. The aedeagus has a pair of ventral processes which are slender, longer than plates, strongly notched on the ventral side just before slightly enlarged tips. The dorsal process has a basal portion which extends dorso-ventrally from which arises on the middle half of the posterior margin a broad rather short process which is narrowed to a blunt apex and is gradually curved dorsally.

Holotype male, allotype female and female paratypes from Gamboa, Canal Zone, Panama, February 1, 1921, and one female paratype from Cristabol, Canal Zone, February 20, 1921, collected by J. G. Sanders. One female paratype which apparently is this species is from Valles, S.L.P., Mexico, January 1, 1938, collected by J. S. Caldwell.

***Cloanthanus hebetus* n. sp.**

In general appearance resembling a broad, blunt headed *frontalis* but with distinct genitalia. Length 4 mm.

Vertex short, bluntly angled, slightly longer at middle than basal width between the eyes.

Color: Vertex black with a white spot at apex and a broken white band just back of apex. Pronotum black with traces of five pale longitudinal stripes. Scutellum pale with basal angles dark. Elytra heavily marked with dark brown vermiculate lines, costal area paler with dark, conspicuous costal veinlets. Face entirely pale yellow.

Genitalia: Female last ventral segment, broadly roundedly produced,

slightly notched at middle. Male plates elongate triangular; styles with a short apical finger-like process on inner margin which curves outwardly. Aedeagus branched near base forming a pair of divergent, short, straight processes. At the point of branching an erect process extends dorsally almost to top of pygofer from the middle of which a long slender, straight process extends dorsocaudally beyond the ventral processes.

Holotype male and allotype female collected at Guadalajara, Jal., Mexico, elevation 5000 feet, October 3, 1941, from mixed vegetation of shrubs and herbs by C. C. Plummer, J. S. Caldwell, E. E. Good, and the author.

***Cloanthanus vinculus* n. sp.**

In general appearance resembling *alas* but with blunter vertex, lighter color and distinct male genitalia. Length 4.5 mm.

Vertex bluntly angled, almost one-third longer at middle than basal width between the eyes.

Color: Vertex pale brown with a narrow wedge shaped white mark at apex. A pair of white spots either side before eyes forming a transverse band and a broad transverse band at base. Pronotum pale brown, scutellum with basal angles orange and apical angle yellowish. Elytra pale brownish sparsely irrorate with dark brown, forming only a few pale spots. Face pale yellow.

Genitalia: Female last ventral segment broadly, shallowly notched either side between lateral angle and broad slightly produced median half. Male plates triangular, bluntly pointed. Style rather short and broad with a thick finger-like process on inner margin at apex which curves inwardly at base then outwardly at apex. Aedeagus with a broad ventral portion from which arises at its apex a pair of short pointed ventral spines. From the same point arises a central erect posterior process, an anteriorly erect anterior process curved anteriorly at apex and a pair of divergent dorsal processes which are longer than any of the others, and curve ventrally at apex forming a foot-like structure with the toe pointing downward.

Holotype male, allotype female and male and female paratypes collected at Iguala, Gro., Mexico, elevation 2400 feet, October 25, 1942, by E. E. Good and the author.

***Cloanthanus vermiculatus* n. sp.**

Resembling *stonei* in general form and appearance but with shorter head and distinct genitalia. Length 4.5 mm.

Vertex bluntly angled, one-third longer on middle than basal width between the eyes.

Color: Vertex dark brown margin white and with a median white stripe at apex and a white spot on margin either side about half way between apex and eye. Pronotum dark brown with white vermiculate markings on

anterior margin behind each eye. Scutellum dark brown, central portion marked with small white spots. Elytra with rather heavy dark brown irrorations, dark brown veins and costal veinlets forming several white areolar spots. Face appearing black, heavily marked with dark brown irrorations, a small white spot just beneath apex.

Genitalia: Female last ventral segment broadly truncate, slightly keeled on middle. Male plates convexly rounded to blunt, broadly rounded apices. Style broad at base, gradually tapered to pointed apex. Aedeagus with a ventral process which is straight and deeply cleft at apex forming two long parallel approximate spine-like processes. The dorsal process is rather large, "U" shaped, with the anterior portion forming two arms at the bottom of the loop where it is attached to the ventral portion of the aedeagus.

Holotype male and allotype female collected at Zacapu, Mich., Mexico, elevation 8000 feet, October 4, 1941, by C. C. Plummer, J. S. Caldwell, E. E. Good and the author.

***Cloanthanus irroratus* (V.D.)**

Platymetopius irroratus V.D. Anns. Ent. Soc. Amer. 3: 227, 1910.

A brown species with a banded vertex and an irrorate face. Length 3.5-4 mm.

Vertex produced and angled, a little more than one-third longer on middle than basal width between the eyes.

Color: Vertex dark brown with a wedge shaped apical pale spot, a series of short pale longitudinal lines forming a transverse band before eyes and base pale. Pronotum brown with five pale longitudinal lines. Scutellum pale, basal angles orange. Elytra rather sparsely irrorate forming several pale areas. Face pale brown irrorate with darker brown.

Genitalia: Female last ventral segment with posterior margin broadly roundedly produced. Male plates triangular. Style with a finger-like apical process which curves outwardly. Aedeagus broadly "U" shaped with a basal stem. The apical portion of the stem has a pair of processes which are bent anteriorly.

***Cloanthanus apertus* n. sp.**

In form and general appearance resembling *nitridus* but with distinct genitalia. Length 4 mm.

Vertex strongly produced and angled, about one-third longer on middle than basal width between the eyes.

Color: Vertex black with an apical white spot and a white spot on either side half way from apex to eye. Pronotum black with traces of five pale longitudinal lines. Elytra black with numerous white spots and areoles and several white oblique marks between costal veinlets. The largest spot is just inside the first apical cell. Face bright yellow, slightly infuscated just below vertex margin.

Genitalia: Female last ventral segment with posterior margin truncate. Male plates short, triangular. Styles not constricted to form finger-like processes but tapered to pointed apices. Aedeagus composed of a single piece, bent "U" shaped with the base and apex directed dorsally. Apex bifid forming two separated spine-like projections.

Holotype male and allotype female collected by the author at Tamazunchale, S.L.P., Mexico, elevation 500 feet on September 14, 1939, from herbaceous growth in an open wooded area near the Moctezuma river.

***Cloanthanus piperatus* n. sp.**

In general form resembling *xanthanus* but with distinct peppered, speckled coloration and distinct genitalia. Length 4 mm.

Vertex bluntly angled, about one-third longer on middle than basal width between eyes.

Color: Vertex pale at base, the anterior two-thirds rather heavily infuscated with a short wedge-shaped spot at apex and a semicircular area enclosing a small brown spot on margin each side just before eyes. The infuscated portion is streaked with longitudinal plane lines. Pronotum milky white, scarcely marked. Scutellum pale yellow. Elytra milky white tinged with brown and sparsely peppered with small brown dots. Veins pale brown. Costal veinlets dark brown on margin. Face pale yellow.

Genitalia: Male plates short, triangular, apices blunt. Styles deeply notched on outer margin, forming a short thick finger-like process on inner margin which curves outwardly. Aedeagus a single process which is broadly "U" shaped in lateral view. The basal end is thickened and extends dorsally, the bend in the "U" is attached to the connectives and the apex extends dorsally at the caudal extremity and bears a lateral spine on each side at apex. The aedeagus resembles that of *nitridus* in general form but is much shorter and is shaped differently at base.

Holotype male, from Hacienda Nainari, near Cajame Sonora, Mexico, collected by Dr. Alfons Dampf, August 10, 1927, swept from a weed called "estafiate."

***Cloanthanus nitridus* n. sp.**

In general appearance resembling *frontalis* but with distinct markings and male genitalia. Length 4-4.5 mm.

Vertex rather strongly produced and angled, about one-third longer at middle than basal width between eyes.

Color black above. Vertex with three conspicuous white markings, an elongate spot at apex and a broader elongate spot arising each side on margin half-way from apex to eye and parallel to apical spot. Pronotum and scutellum scarcely marked. Elytra with oblique white dashes between costal veinlets and a few white areolar spots. Face entirely bright yellow.

Genitalia: Female last ventral segment with posterior margin broadly roundedly produced. Male plates rather short, triangular, with blunt apices. Style deeply notched on outer margin just before apex, forming a finger-like process on inner margin which curves strongly outwardly. Aedeagus composed of a single process which is rather long, broadly "U" shaped and is broadened at the apex to form a broadly rounded tip which bears a short lateral spine on each side.

Holotype male, allotype female and male and female paratypes collected at Fortin, Vera Cruz, Mexico, elevation 3200 feet, October 9, 1941, from an area of second growth scrub and herbaceous vegetation, by C. C. Plummer, J. S. Caldwell, E. E. Good and the author.

Male and female paratypes have also been collected at: Zamora, Mich., Mexico, elevation 5600 feet, October 2, 1941; Zimapan, Hgo., Mexico, elevation 6000 feet, October 25, 1941; Chilpancingo, Gro., Mexico, elevation 4500 feet, October 25, 1941; Orizaba, V.C., Mexico, elevation 4100 feet, October 8, 1941; Tehuacan, Pue., Mexico, elevation 7000 feet, October 17, 1941; Carapan, Mich., Mexico, elevation 7200 feet, October 2, 1941; Uruapan, Mich., Mexico, elevation 5500 feet, October 1, 1941; Mexico City, Mexico, elevation 7400 feet, September 9, 1939; Chapingo, Mexico, elevation 7300 feet, October 10, 1941; Jacala, Hgo., Mexico, elevation 6600 feet, September 26, 1941; Valles, S.L.P., Mexico, elevation 300 feet, September 24, 1941; Jesus Carranza, V.C., Mexico, elevation 125 feet, October 14, 1941; all collected by (DeLong-Good-Caldwell-Plummer); Cordoba, V.C., Mexico, elevation 2500 feet, October 13, 1937 (W. E. Stone); Finca Vergel, Chiapas, Mexico, elevation 2600 feet May 15, 1935 (A Dampf); Penon Viego, D.F., Mexico, November 5, 1924; Lake Peten, Guat., Mexico, November 17, 1925; Portero, V.C., Mexico, October 28, 1924 (A. Dampf); Cosomatepec, V.C., Mexico, November 30, 1924; Bar Honda, Chiap., Mexico, elevation 3960 feet, February 24, 1931 (J. Parra); Montemorelos, N.L., Mexico, elevation 1425 feet, June 1, 1930; Vergel, Chia., Mexico, elevation 3000 feet, June 2, 1935; El Mante, Tomil., Mexico, elevation 245 feet, June 2, 1931; Cuernavaca, Morelos, Mexico, elevation 5000 feet, September 8, 1939, DeLong; Taxco, Gro., Mexico, elevation 5609 feet, September 9, 1939, Acapulco, Guer., Mexico, elevation sea level, September 10, 1939 (DeLong and Plummer); Penon Marquez, D.F., Mexico, May 11, 1924 (A. Dampf).

***Cloanthanus caldwelli* n. sp.**

In form and general appearance resembling *fuliginosus* but with distinct genitalia. Length 4 mm.

Vertex produced, blunt at apex, more than one-third longer at middle than basal width between eyes.

Color dark brown with a pale wedge-shaped spot at apex a pale transverse band before eyes and another on base. Pronotum dark brown with faint traces of pale longitudinal stripes. Scutellum with apical half broadly white margined. Elytra heavily irrorate with dark brown, forming several pale areolar spots. Face bright yellow infuscated just beneath margin of vertex.

Genitalia: Male plates triangular, apices bluntly pointed. Style with a short thick finger-like process on inner margin. Aedeagus composed of a single process which is broad and thick in lateral view and which is divided not far from base forming a thick short anterior portion and a longer posterior portion which is truncate at apex but forms an enlarged broad tooth on inner margin just before apex. These two arms form a "V".

Holotype male collected at Valles, S.L.P., Mexico, elevation 300 feet, November 7, 1941 by J. S. Caldwell, E. E. Good and the author. I take pleasure in naming this unique species for Dr. J. S. Caldwell who has collected and described many interesting Mexican Homoptera.

***Cloanthanus alas* n. sp.**

In general form resembling *dodononius* but darker in color and with distinct male genitalia. Length 4.5 mm.

Vertex produced and bluntly angled, one-third longer on middle than basal width between the eyes.

Color: Vertex dark brown with a wedge-shaped white spot at apex, a pair of white spots arranged obliquely toward disc on each side before the eyes and base pale. Pronotum dark brown with faint longitudinal lines. Scutelum dark brown, scarcely marked. Elytra brown, irrorate with dark brown forming few pale spots. Veins and numerous costal veinlets dark brown. Face bright yellow.

Genitalia: Male plates triangular, bluntly pointed. Style with a medium sized thick finger-like process produced on inner margin at apex. Aedeagus composed of a single piece which curves dorsally then extends caudally and tapers from base to apex. A conspicuous dorsal process extends dorsally at the point where the aedeagus bends caudally. Just before apex, a broad triangular process, pointed at apex extends obliquely on either side from aedeagus shaft forming what appears as a pair of wings.

Holotype male collected at Tamazunchale, S.L.P., Mexico, August 28, 1939 by F. M. and D. M. DeLong from herbaceous vegetation in the Moctezuma River Valley at an elevation of 500 feet.

***Cloanthanus alas* var. *parvalas* n. var.**

In form and general appearance resembling *alas* but with head bearing fewer pale markings and with apical "wings" of aedeagus tip smaller. Length 4 mm.

Vertex one-third longer at middle than basal width between the eyes.

Color: brown, a short wedge shaped white spot at apex of vertex, longitudinal white stripes arranged obliquely from margin before eyes, on either side to disc. Pronotum dark brown, elytra heavily infuscated with brown, face bright yellow.

Genitalia: Female last ventral segment roundedly produced median third almost truncate on posterior margin. Male plates rather short, triangular, apices blunt. Style with broad apical finger-like process on inner margin. Aedeagus rather long tapered from base to apex which is fitted with a pair of small wing-like processes which are placed diagonally and directed dorsally and laterally. The aedeagus extends dorsally then curves

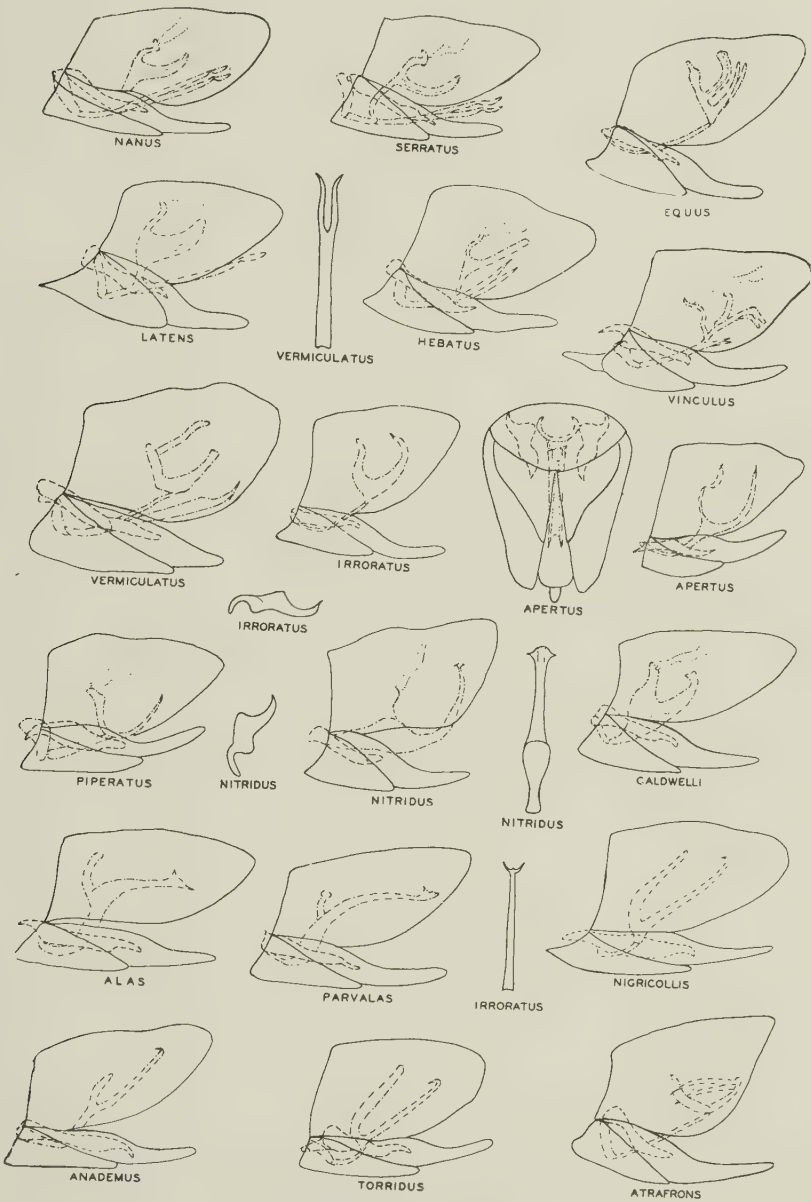


PLATE I. Lateral view of tip of abdomen of the males of species as designated showing the genital structures in position. In addition the ventral view of *apertus*, the ventral views of the aedeagi only of *vermiculatus*, *nitridus* and *irroratus* and the ventral views of the styles of *irroratus* and *nitridus*.

caudally at about one-fourth its length. A short finger-like spur arises on dorsal side near base where the aedeagus curves and extends dorsally.

Holotype male, allotype female and male paratypes collected at Orizaba, Vera Cruz, Mexico, elevation 4000 feet, October 8, 1941, by Plummer, Good, Caldwell and the author. Male paratypes were also collected at Virgin Forest, British Honduras, October 16, 1925, by Dr. Alfons Dampf.

***Cloanthanus nigricollis* (Ball)**

Platymetopius nigricollis Ball Ent. News 27: 205, 1916.

A blunt headed yellow species with a black vertex and a dark irrorate face. Length 3.5–4.2 mm.

Vertex short, bluntly angled, almost as wide between eyes at base as median length.

Color: Vertex pale heavily irrorate so as to appear black. Pronotum, scutellum and elytra yellowish green. The elytra are usually scarcely irrorate in the female but conspicuously irrorate in the male. Face yellow, heavily irrorate with brown forming three white spots on margin of vertex. Ocelli white.

Genitalia: Female last ventral segment broadly, slightly roundedly produced on posterior margin. Male plates rather long, triangular. Style long with a short curved finger-like process at apex on inner margin. Aedeagus "V" shaped with a longer ventral process than the dorsal process. The ventral process has a pair of short apical teeth which are bent anteriorly and slightly basally.

This is a rather common desert species in southern California and Arizona and although no specimens are at hand from that area it undoubtedly occurs in northwestern Mexico.

***Cloanthanus anadamus* n. sp.**

A brownish species with banded vertex and pale face. Length 4 mm.

Vertex with a blunt apex, one-third longer at middle than basal width between the eyes.

Color: Vertex dark brown with a wedge shaped spot at apex, a series of white spots forming a transverse band anterior to eyes and another band at base. Pronotum with traces of pale longitudinal lines. Scutellum tinged with orange. Elytra rather heavily irrorate with brown forming several white areolar spots and with several pale areas between the dark brown costal veinlets. Face dull yellow, infuscated above.

Genitalia: Female last ventral segment roundedly produced on posterior margin. Male plates triangular, apices blunt. Style with apical fourth narrowed to form a finger-like process on inner margin which curves outwardly. Aedeagus branched near base to form a longer slender ventral portion which has a pair of short apical spines which are directed basally, and a

dorsal arm which is parallel to the ventral portion forming a "U" at the base but which is only about one-third as long as the ventral portion.

Holotype male, allotype female and male and female paratypes collected at Cristobal, Panama, Canal Zone, February 20, 1921, by J. G. Sanders.

***Cloanthanus torridus* (Ball)**

Platymetopius brevis var. *torridus* Ball Ent. News 27: 205, 1916.

A blunt headed brownish species with a dark brown face. Length 3.5-4 mm.

Vertex bluntly angled, a little longer at middle than basal width between eyes.

Color: Vertex dark brown to black on anterior margin. A white spot either side on margin half way between apex and eye. Disc and basal portion with pale mottling. Pronotum and scutellum dull brown. Elytra pale brown veins and scattered brown irrorations forming several pale areolar spots. Face heavily irrorate with dark brown.

Genitalia: Female last ventral segment with posterior margin slightly broadly produced, almost truncate. Male plates rather long, tapered to blunt apices. Style elongate, narrow, with a short, slender apical finger-like process on inner margin which curves outwardly. Aedeagus forming an elongated "U" which is inclined at an angle. The ventral portion is more slender with a pair of short spine-like processes curved dorsally and basally at apex. The dorsal portion is thicker and is almost as long as the ventral portion. The aedeagus is like *nigricollis* in form.

This species occurs in southern Arizona along the Mexican border and is probably common in the northern desert region.

***Cloanthanus jocosus* (V.D.)**

Platymetopius jocosus V.D. Proc. Calif. Acad. Sci. 12: 179, 1923.

A dark red species of the *torridus* group with white elytra. Length 3.5 mm.

Vertex bluntly angled as long at middle as basal width between eyes.

Color: dull dark red, scarcely mottled, paler on scutellum. Elytra white, veins faintly lined with brown, reticulations nearly obsolete. Costa reddish, apex covered by an irrorate fuscous cloud reaching two-thirds the distance to the transverse veins.

Genitalia: Female last ventral segment slightly produced at middle on posterior margin.

This species was described from a single female specimen collected on Ceralbo Island, Gulf of California and no specimens have been available for examination or dissection.

***Cloanthanus scutellatus* (V.D.)**

Platymetopius scutellatus V.D. Proc. Calif. Acad. Sci. 12: 180, 1923.

A blunt headed species with a conspicuous orange scutellum. Length 3 mm.

Vertex slightly longer at middle than basal width between the eyes.

Color: dark fuscous, vertex yellowish marked with fuscous. Pronotum irrorate with white, marked with five distinct pale longitudinal lines. Scutellum orange, basal angles, a mark before the apex and two dots near base, fuscous. Elytra white with heavy fuscous vermiculations, giving them a blackish appearance, forming large and conspicuous round white spots, especially two on the commissure. Face pale ochre-yellow, minutely dusted with darker on the front.

Genitalia: Female last ventral segment truncate and feebly sinuate, the lateral angles and middle slightly produced. Male valve obtusely angled, plates triangular, blunt.

This species was described from a single pair of specimens from San Marcos Island, Gulf of California. No material has been available for study and dissection.

***Cloanthanus atrafrons* n. sp.**

In form and general appearance resembling *acutus* but with a heavily infuscated face and distinct genitalia. Length 4.5 mm.

Vertex strongly produced and pointed, twice as long at middle as basal width between eyes.

Color: Vertex dark brown with a long narrow apical pale stripe and a few slender longitudinal pale markings along margin and on disc. Pronotum pale, mottled with pale and with five longitudinal pale lines. Scutellum with basal angles dark brown, median third paler. Elytra irrorate, with brown forming many white areas or areolar spots. Face heavily irrorate with brown.

Genitalia: Female last ventral segment broadly, roundedly produced on posterior margin. Male plates triangular, gradually tapered to blunt apices. Style rather short abruptly narrowed near apex to form a short finger-like process on inner margin which curves strongly outwardly. Aedeagus with a long straight ventral portion which attaches to a concavely curved portion, at the apex of which are two long blade-like processes which extend anteriorly beyond the anterior arm of the curved portion.

Holotype male collected at Cuernavaca, Morelos, Mexico, elevation 4900 feet, November 20, 1933, by Dr. Alfons Dampf. Swept from grass and low vegetation under mango and other fruit trees. Allotype female collected at Yaqui Valley, Sonora, Mexico, November 19, 1935 by Dr. Dampf.

***Cloanthanus fuliginosus* (Osb.)**

Platymetopius fuliginosus Osborn Ann. Carn. Mus. 15: 34, 1923.

A dark brown species resembling *acutus* in form and general appearance. Length 4 mm.

Vertex produced and bluntly angled, about one-third longer on middle than basal width between the eyes.

Color: dark brown to black. Vertex with an apical wedge-shaped spot, two spots each side half way from apex to eyes, and a pair on base. Pronotum brown with the five usual pale longitudinal stripes. Scutellum brown with a white spote on either side half way from pronotum to apex. Elytra rather heavily irrorate with brown forming numerous white areolar spots. Face bright yellow, smoky just beneath margin.

Genitalia: Female last ventral segment broadly roundedly produced. Male plates rather short triangular with pointed apices. Style with a short apical finger-like process on inner margin which curves outwardly. Aedeagus consisting of a single piece which is broadly "U" shaped in appearance with the ends extending dorsally. The apex bears a pair of long slender processes which are directed anteriorly, reaching more than two-thirds the distance to the anterior arm of the aedeagus.

Specimens which agree with the type are at hand from Santa Engracia, Mexico, elevation 1050, November 3, 1938 (Caldwell); Cordoba, C.V., Mexico, elevation 3000 feet, October 8, 1941; Chilpancingo, Gro., Mexico, elevation 4400 feet, October 25, 1941; Iguala, Gro., Mexico, elevation 3600 feet, October 25, 1941; Mexcala, Gro., Mexico, elevation 1700 feet, October 22, 1941; Taxco, Gro., Mexico, elevation 5700 feet, October 26, 1941; Tehuantepec, Oax., Mexico, elevation 0-328 feet, October 13, 1941; Tehuacan, Pue., Mexico, elevation 5300 feet, October 17, 1941; Cuernavaca, Mor., Mexico, elevation 4900 feet, November 20, 1933; Tamazunchale, S.L.P., Mexico, elevation 350 feet, September 14, 1939.

***Cloanthanus loricatus* (V.D.)**

Platymetopius loricatus V.D. Bull. Buff. Soc. Nat. Hist. 5: 205, 1894.

A brown species without conspicuous markings and with a pale yellow face irrorate with brown. Length 4 mm.

Vertex with a blunt apex, one-third longer on middle than basal width between eyes.

Color: Vertex chestnut brown with the usual white mark at apex and some short pale longitudinal lines arranged obliquely from margin to disc. Pronotum brown tinged with red, and with white longitudinal stripes. Scutellum pale brown with the apical third white. Elytra light brown with paler areolar spots. Face yellow, irrorate with pale brown.

Genitalia: Female last ventral segment appearing truncate. Male plates short, triangular. Style short with a strongly curved finger-like process at apex. Aedeagus "L" shaped with a pair of rather long apical processes extending dorsally and anteriorly.

The species has already been reported for Mexico but the record is doubtful. The writer has had for study a pair of specimens from the type series in the Van Duzee collection. The female is from Jamaica and the male from Ft. Myers, Florida. It is quite doubtful if these are the same species. The female is undoubtedly correct but the male as figured may be incorrect. The male from Jamaica when dissected and illustrated may prove to be different.

***Cloanthanus acuminatus* n. sp.**

Resembling *acutus* in general appearance but with distinct genitalia. Length 4 mm.

Vertex strongly produced and angled, about twice as long at middle as basal width between the eyes.

Color: Vertex brown marked with longitudinal white stripes or spots. An elongated spot at apex, one either side along margin half-way between apex and eyes, a pair of separated stripes on disc and a pair of elongated spots at base, white. Pronotum brown with pale longitudinal stripes. Scutellum brown with a small spot in each basal angle and spots on disc white. Elytra rather densely infuscated with brown forming numerous white areolar spots. Face pale creamy yellow.

Genitalia: Female last ventral segment with posterior margin gradually produced to a median blunt, slightly produced tooth. Male plates rather long, triangular. Styles with a short finger-like process which is curved outwardly. The aedeagus is composed of a single process which is curved like a broad "U" with the base and apex turned upward and the ventral curved portion attached to the connective. The apex bears a pair of long lateral processes which curve ventrally and extend basally almost one-half the length of the visible ventral portion.

Holotype male, allotype female and male and female paratypes collected at Colima, Colima, Mexico, elevation 1600 feet, January 27, 1930, by Dr. Alfons Dampf, and swept from weeds near a brook.

***Cloanthanus fluxus* n. sp.**

Resembling *acutus* in general appearance but with shorter vertex and distinct genitalia. Length 4.5-5 mm.

Vertex produced and bluntly angled, almost one-third longer on middle than basal width between the eyes.

Color: Vertex marked with dark brown, a white dash at apex and a curved mark on margin arising half-way from eye to apex, extending to eye. White longitudinal markings at base. Pronotum dark brown with pale longitudinal white lines. Pronotum with a small white spot in each basal angle and white spots on median half. Elytra rather uniformly marked with minute pigment spots, veins and costal veinlets darker brown. Face heavily irrorate with dark brown, a small white spot just below apex.

Genitalia: Female last ventral segment with posterior margin truncate. Male plates long, triangular, apices rather sharply angled. Style constricted about middle, the apical portion bearing a long strongly curved finger-like process on inner margin which curves strongly outwardly. Aedeagus consisting of one piece which extends caudally with a dorsal spur-like process not far from the base. The apex is composed of a ventral pair of long spine-like processes which are proximal and a pair of shorter dorsal processes which curve dorsally and extend caudally at about two-thirds the length of the body of aedeagus.

Holotype male and paratype male from Carapan, Mich., Mexico, elevation 7200 feet, October 2, 1941. Allotype female and paratype male and females from Jacala, Hdg., Mexico, elevation 6600 feet, September 26, 1941. Female paratype collected north of Zimapan, Mexico, Km 223, elevation 7800 feet, October 30, 1941. All specimens were collected by C. C. Plummer, J. S. Caldwell, E. E. Good and the author and are associated with the oak forest area.

***Cloanthanus stonei* n. sp.**

A short headed species with blunt vertex and a dark face. Length 4 mm.

Vertex short and broad, a little longer at middle than basal width between eyes, apex blunt.

Color: Vertex pale brown with a prominent white "V" shaped spot at apex and a few white dashes on disc and base. Pronotum mottled with dark brown with five longitudinal pale stripes. Scutellum orange red on basal half, apical half pale. Elytra with rather heavy dark brown markings, forming several white areolar spots. Face dark brown with traces of pale arcs.

Genitalia: Female last ventral segment with posterior margin almost truncate, slightly sinuate and dark margined. Male plates short, rounded to blunt apices. Style short, broad, only moderately notched on outer margin to form a broad terminal finger-like process. Aedeagus with a pair of rather long ventral processes which are proximal to near apex where they are divergent and slope dorsally forming enlarged apical portions. The dorsal portion is slender, extends caudally, is slightly enlarged at apex from which it extends back upon itself then curves dorsally to form an enlarged antero-dorsal apex.

Holotype male, allotype female and male and female paratypes were collected by Mr. W. E. Stone in his garden in Mexico City, D.F., elevation 7500 feet, September 4, 1936.

Paratypes are also at hand from Cordoba, V.C., Mex., elevation 2500 feet, May 13, 1937 (Stone); Mexico City, D.F., Mexico September 5, 1939 (DeLong); Iguala, Gro., Mex., elevation 2300 feet, September 11, 1939 (Plummer and DeLong); Zamora, Mich., Mex., elevation 5800 feet, October 2, 1941 and Puebla, Pue., Mex., elevation 8500 feet, October 18, 1941 (Plummer, Caldwell, Good and DeLong) I take pleasure in naming this insect for Mr. W. E. Stone who has collected so many interesting leafhoppers in the United States and Mexico.

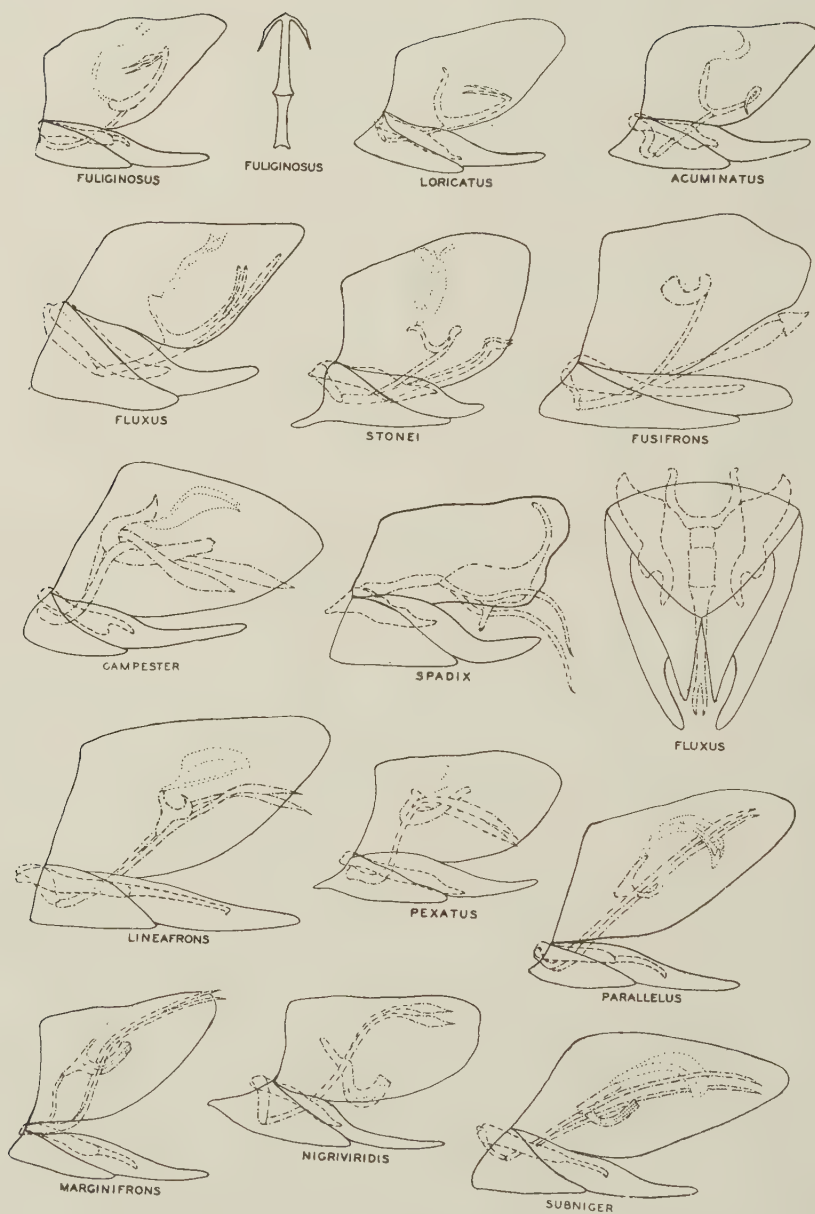


PLATE II. Lateral view of tip of abdomen of the males of species as designated. Also the ventral view of *fluxus* and the ventral view of the aedeagus only of *fuliginosus*.

***Cloanthanus fuscifrons* (V.D.)**

Platymelopus fuscifrons V.D. Bull. Buff. Soc. Nat. Hist. 5: 206, 1894.

A short headed dark brown species with a heavily irrorate dark brown face. Length 4-4.5 mm.

Vertex short, bluntly angled a little longer on middle than basal width between the eyes.

Color: Vertex with a white wedge shaped spot at apex, a narrow white transverse band just before eyes, and the area between the eyes dark brown. Pronotum dark brown mottled, anterior margin pale. Scutellum with apical portion broadly white margined. Elytra irrorate with dark brown, with many white spots and areoles. Face irrorate with dark brown, appearing black, with indications of pale arcs.

Genitalia: Female last ventral segment, roundedly produced on posterior margin. Male plates broad, bluntly rounded at apices. Style elongate, the apical third forming a finger-like process which is straight and thick. Aedeagus composed of a pair of straight, stout ventral processes which extend almost to apex of pygofer on ventral margin and are notched just before apex on ventral and dorsal margins forming a short, broad spear head apex. The dorsal portion is directed dorso-caudally and bears a broad curved apical portion which extends ventrally then curves anteriorly, then dorsally.

This species has been taken in both southern California and southern Arizona, but no records for Mexico seem to be available. Some close relatives of this species have been found in Mexico.

***Cloanthanus campester* n. sp.**

In general appearance resembling *acutus* but with a shorter, broader vertex and distinct genitalia. Length 5.5 mm.

Vertex strongly produced and angled at least one-fourth longer at middle than basal width between the eyes.

Color: Vertex brown with a median apical white wedge-shaped spot and pale irregular linear markings. Pronotum rather dark brown. Scutellum orange brown. Elytra marked with brown spots and ramose pigment lines. Veins and costal veinlets darker brown. Face dull yellow, infuscated just below margin and with the "shark's mouth" pale mark.

Genitalia: Male plates concavely rounded to blunt apices. Style rather long with a short, rather thick finger-like process on inner margin at apex which is curved outwardly. Aedeagus with a pair of ventral processes which are narrow at base and form broad blades just before pointed apices which extend almost to apex of pygofer. Dorsal portion of aedeagus thick forming a "U" open toward the caudal end of the genital chamber and with the dorsal portion of the "U" less than half as long as the ventral portion.

Holotype male collected in Mexico City, D.F. Mexico, elevation 7500 feet, June 1, 1937, by Mr. W. E. Stone.

***Cloanthanus pexatus* (V.D.)**

Platymetopius pexatus V.D. Proc. Calif. Acad. Sci. 41: 415, 1925.

In general appearance resembling *acutus* but with longer vertex and distinct male genitalia. Length 4.5–5 mm.

Vertex long, acutely pointed, about two and one-half times as long at middle as basal width between the eyes.

Color: brown with few markings. The median apical line and an indefinite line either side on vertex, pale. The scutellum is lighter brown and the elytra have several pale areoles. Face pale brown, darker just below the margin.

Genitalia: Female last ventral segment produced, with a slight but distinct notch at apex. Male plates rather large, triangular. Style with a curved finger-like process at apex. Aedeagus with a pair of long ventral processes reaching almost to apex of pygofer, the apical third of which is widened into broad blades. The dorsal portion is a narrow "U" the ventral side of which is almost twice as long as the dorsal side. The ventral arm is tapered to a blunt apex.

This has been collected in San Diego Co., California and undoubtedly occurs in Mexico.

***Cloanthanus lineafrons* n. sp.**

A sharp headed species related to *oregonensis* but with longitudinal pale stripes on vertex, pronotum, scutellum and face. Length male 5.5 mm.

Vertex strongly produced and angled, twice as long on middle as basal width between eyes.

Color: pale brown marked with pale lines and spots. Vertex with a stripe on apical third and a longitudinal stripe either side arising half-way to eye and extending to middle of eye where it does not connect with the basal portion. Pronotum with seven broad, pale longitudinal stripes each bordered with dark brown lines. Scutellum with a slender median longitudinal stripe, a pair of broader, brown bordered pale parenthesis stripes, one either side and a short one in each basal angle. Elytra mottled with white spots and marked with small dark brown pepper spots. Margins pale with a few brown costal veinlets. Face brown, with a median longitudinal stripe from margin of vertex to clypeus. A white stripe just below margin of vertex and another parallel to it between the eyes. Three longitudinal stripes on each lora. Each white stripe is bordered by dark brown lines.

Genitalia: Male plates long convexly rounded to blunt apices. Style

long and slender, narrowed abruptly on outer margin at about half its length to form a long slender finger-like apical process. Aedeagus composed of a long slender pair of ventral processes which are slightly widened to form narrow blades just before apex and which are almost as long as pygofer. The dorsal portion is composed of a dorso-ventrally directed base from which arises a short stout curved hook which extends caudally and is curved sharply dorsally.

Holotype male, Tamazunchale, S.L.P., Mexico, elevation 600 feet, collected November 15, 1938, by John S. Caldwell. No female specimens at hand seem to belong to this species.

***Cloanthanus marginifrons* n. sp.**

Resembling *lineafrons* in coloration and general appearance but shorter and with shorter vertex and distinct genitalia. Length 5 mm.

Vertex bluntly angled but strongly produced, less than twice as long as basal width between eyes.

Color: brown marked with white longitudinal stripes each margined with brown. Vertex with a median stripe on apical third, and an oblique broken stripe either side between apex and eye converging toward base. Pronotum with seven longitudinal stripes. Scutellum with a median narrow stripe a broader one either side and a short one in each basal angle. Elytra pale brown with dark veins and white spots. Face brown with a median pale longitudinal line, a pale line just beneath margin of vertex and another parallel to it between middle of eyes on face. Two longitudinal lines on each lora.

Genitalia: Female last ventral segment roundedly produced with a short median produced tooth at apex. Male plates elongate, triangular, with blunt apices. Style with apical third abruptly narrowed and produced, forming a finger-like outwardly curved process. Aedeagus with a pair of long slender ventral processes which are as long as pygofer. The dorsal portion is composed of a fairly broad curved process which extends caudally then abruptly curves dorsally and is broadened on apical fourth.

Holotype male collected at Zamora, Mich., Mexico, October 2, 1941. Allotype female and paratype males and female from Puebla, Pue., Mexico, October 18, 1941, collected by C. C. Plummer, J. S. Caldwell, E. E. Good and the author. Paratype males collected at Iguala, Gro., Mexico, October 25, 1941, and Tasquilla, Hild., Mexico, October 29, 1941, by E. E. Good and the author.

***Cloanthanus parallelus* n. sp.**

In form and appearance resembling *marginifrons* but with distinct genitalia. Length 4.5 mm.

Vertex angularly produced about one-half longer on middle than basal width between eyes.

Color brown with pale longitudinal lines. Vertex with a median pale stripe on apical third. Two proximal lines extend from this to base on middle of vertex. An oblique pale line extends from margin of vertex at a point between apex and eye to the proximal lines between the eyes. Pronotum with seven pale longitudinal stripes. Scutellum pale, basal angles brown. Elytra pale subhyaline sparsely brown mottled and with brown veins. Face brown with a median pale longitudinal stripe. A pale stripe just beneath margin of vertex and two parallel lines ventral to marginal line and between the eyes. Two longitudinal pale lines on each lora.

Genitalia: Male plates long, rather narrow, with blunt apices. Style long gradually narrowed from base to form long slender apices which are one-third the length of entire style. Aedeagus with a pair of long slender ventral processes which are shorter than pygofer. The dorsal process is short and "U" shaped with a basal portion from the ventral side of which arises a process which extends caudally then curves abruptly dorsally and extends the length of the basal arm.

Holotype male and paratype male collected at Chapultepec Heights, D.F., Mexico, near Mexico City, November 3, and 5, 1924, by Dr. Alfons Dampf.

***Cloanthanus hymenocleae* (V.D.)**

Platymetopius hymenocleae V.D. Proc. Calif. Acad. Sci. 12: 178, 1923.

Related to *nigriviridis* but with a white band across base of front. Length 4 mm.

Vertex more than twice as long at middle as basal width between the eyes.

Color: Vertex pale yellow marked with broken, longitudinal crenulate, fuscous lines most of which become faint posteriorly. Pronotum white tinged with green anteriorly faintly irrorate. Scutellum yellow with darker basal angles. Elytra white with a broad fuscous vitta indicated along the outer margin of clavus and traces of vittae on corium as in *nigriviridis*. Apex of elytra faintly infuscated with the edge white and white spots along the transverse veins. Face deeper yellow. Apex of front with fuscous lines and with a broad white transverse band.

Genitalia: Female last ventral segment produced at middle for about one-third its length beyond the lateral angles. Male valve long and conically rounded at apex. Plates long, triangular, about as long as valve and subacute at apex.

This species was described from two male and three female specimens from Angel de la Guardia Island and Mejia Island in the Gulf of California. Specimens have not been available for dissection.

***Cloanthanus nigriviridis* (Ball)**

Platymetopius nigriviridis Ball Ent. News 20: 163, 1909.

A pale species with greenish head marked with dark longitudinal lines. Length 3.5-4.5 mm.

Vertex in female produced and sharp pointed, more than twice as long as basal width between eyes. In male the vertex is short and blunt about one-third longer at middle than basal width between eyes.

Color: Female vertex greenish with fine longitudinal dark lines particularly on middle and apical portion. Elytra pale straw yellow, with infuscations along claval suture and veins on apical portion brown bordered. Male similar in color except the black markings on vertex are fewer and less intense. Face pale green slightly infuscated just beneath margin.

Genitalia: Female last ventral segment broadly roundedly produced on posterior margin. Male plates triangular with blunt apices. Style elongated with short curved apical finger-like processes. Aedeagus with a pair of ventral processes which are slender but broadened just before apex to form blade-like tips. The dorsal process resembles a pipe with the bowl broadened forming the apical portion and the bent stem the basal part.

This species has been taken on the border at Tia Juana, Mexico, and it probably is distributed more widely in the northern part of Mexico.

***Cloanthanus spadix* n. sp.**

In general appearance resembling *fuliginosus* but with vertex more banded and with distinct genitalia. Length 4.5 mm.

Vertex produced and bluntly angled, about one-third longer at middle than basal width between the eyes.

Color: dark brown, vertex with a pale wedge shaped spot at apex. A series of linear pale spots forming a cross band before eyes and another on the base. Pronotum brown unmarked, Scutellum with several pale spots on disc. Elytra heavily irrorate with brown forming white areolar spots and with apical costal area broadly white. Face dull yellow distinctly infuscated.

Genitalia: Female last ventral segment with posterior margin roundedly produced. Male plates rather short, triangular, apices blunt. Style rather short and broad with a short finger-like process on inner margin which is curved strongly outwardly. Aedeagus with a pair of long curved spine-like processes arising near base with the apices curved sharply ventrally at the apex of pygofer and conspicuous below the pygofer. The dorsal portion in lateral view is enlarged, just beyond the point where the ventral processes arise, and extends to the tip of the pygofer where it is produced in a long slender dorsal portion which extends to dorsal wall of pygofer and curves anteriorly. A large ventral spine extends ventrally at about the middle of the enlarged portion.

Holotype male collected near Rodriguez, Nuevo Leon, Mexico, during June 1931 from desert. Allotype female collected at Guadalajara, Mexico, elevation 5000 feet, August 2, 1939, by W. E. Stone.

***Cloanthanus subniger* n. sp.**

In general appearance resembling *frontalis* but with distinct male genitalia. Length 3.5-4 mm.

Vertex produced and bluntly angled, one-third longer on middle than basal width between eyes.

Color: Vertex black with a white longitudinal spot at apex, a small spot on either side above margin about half-way from apex to eye and four white spots forming a transverse band at the same relative position. Pronotum black with five longitudinal pale lines. Scutellum with a small white spot on either side not far from apex. Elytra rather heavily mottled with black forming numerous white areolar spots and large white areas between black costal veinlets. Face yellow slightly infuscated just beneath margin.

Genitalia: Female last ventral segment broadly roundedly produced on posterior margin. Male plates elongate. Styles long, narrow, with an apical finger-like process which is almost as long as the basal portion and extends caudally. Aedeagus composed of a ventral portion consisting of two long slender processes which extend almost to tip of pygofer and a dorsal portion which is "U" shaped with a protruding point on one side of the base where it attaches to the ventral portion.

Holotype male from Santa Engrasia, Tamaulipas, Mexico, elevation 1200 feet, collected November 3, 1938, by J. S. Caldwell, Allotype female collected at Zimipan, Hgo., Mexico, elevation 7800 feet, September 26, 1941, by J. S. Caldwell, E. E. Good and the author.

***Cloanthaus flavens* n. sp.**

In general appearance resembling *cinereus* but with bluntly angled vertex and distinct male genitalia. Length 4 mm.

Vertex produced and bluntly angled, about one-third longer at middle than basal width between the eyes.

Color brownish cinereus, vertex marked with an apical wedge-shaped spot, and an oblique line either side extending from margin half way between apex and eye to disc where they join with a pair of basal proximal longitudinal stripes. Pronotum dull gray with paler longitudinal lines. Scutellum cinereus with paler markings on disc. Elytra subhyaline with sparse brownish punctate spots, more heavily marked on apical cells. Veins and costal veinlets pale brown. Face pale yellow, infuscated, more heavily marked on lorae and just beneath margin of vertex.

Genitalia: Female last ventral segment broadly roundedly produced on posterior margin to a truncate median third which is slightly notched at

middle. Male plates convexly rounded and tapered to pointed apices. Style long and slender, narrowed near apex to form a short finger-like tip which curves outwardly. Aedeagus with a pair of long slender ventral processes which extend almost to apex of pygofer. The dorsal process is "L" shaped.

Holotype male, allotype female and male and female paratypes collected at Iguala, Gro., Mexico, elevation 3600 feet, Oct. 25, 1941 and Sept. 11, 1939, by C. C. Plummer, E. E. Good and the author.

Paratypes are also at hand from Huetamo, Mich., Mex., elevation 1100 feet, July 22, 1933 (Dampf); Cuantla, Mor. Mexico, elevation approximately 3800 feet. August 27, 1937; Paxtial, Guatamala, elevation 660 feet, November 14, 1925 and Mexcala, Gro., Mexico, elevation 1700 feet, October 22, 1941.

***Cloanthanus aequinoctialis* (V.D.)**

Platymetopius aequinoctialis V.D. Proc. Calif. Acad. Sci. 21: 30, 1923.

According to the original description of this species it is related to *cinereus* with darker colors. Length 4 mm.

Vertex twice as long at middle as basal width between eyes.

Color: fulvo-testaceous becoming darker on elytra apically and more gray on pronotum and apex of vertex. Anterior median line of vertex, a curved vitta either side reaching base and a slender line just behind the apical margin, whitish. Pronotum with seven longitudinal lines, scutellum with three lines. Elytra grayish fulvous, darker apically, face yellow.

Genitalia: Female last ventral segment with median third produced one-third the length of the segment and truncate at apex.

This species was described from a pair collected at Albemarle Island and James Island in the Lower California area and should be found in Mexico but no specimens have been available for dissection.

***Cloanthanus tripunctatus* n. sp.**

In form resembling *heldoranus* but with different coloration and distinct genitalia. Length 4.5 mm.

Vertex strongly produced and angled, about one-third longer on middle than basal width between eyes.

Color: Vertex black, with a white spot at apex, a pair of spots forming a triangle along margin either side just before eye and a basal spot next each eye. Pronotum mottled with brown. Scutellum tinged with orange and marked with white. Elytra rather sparsely marked with brown irrorations. Veins and costal veinlets dark brown. Face yellow slightly infuscated at margin.

Genitalia: Female last ventral segment shallowly excavated between lateral angles either side of a median broad, slightly produced lobe. Male plates long, rather slender and tapered to pointed apices. Style long, slender, tapered near apex to form a slender finger-like terminal process.

Aedeagus composed of two portions. A pair of very slender, long ventral processes extend almost to apex of pygofer and are curved ventrally at apex. A dorsal process is slender forming a long, narrow "U" shaped portion which bears a pair of short process at apex which are bent anteriorly and ventrally.

Holotype male, Lake Chapala, K. 610, Jal. Mexico, elevation 5000 feet, October 3, 1941. Allotype female and female paratypes from Fortin, V.C., Mexico, elevation 2500 feet, October 9, 1941.

Other paratypes are from Saltillo, Coah., Mexico, elevation 6200 feet, September 23, 1941; Zitacuaro, Mich., Mexico, elevation 6500 feet, September 29, 1941; Cuernavaca, Mor., Mexico, elevation 8500 feet, October 21, 1941; Tepotzlan, Mor., Mexico, October 11, 1941; Iguala, Gro., Mexico, elevation 3600 feet, October 25, 1941; and Tuxpan, Mich., Mexico, elevation 4000 feet, October 5, 1941, all collected by C. C. Plummer, J. S. Caldwell, E. E. Good and the author. It apparently occurs on semi-desert ranging in elevation from 2500 to about 5000 feet.

***Cloanthanus speciosus* (V.D.)**

Platymetopius speciosus V.D. Proc. Calif. Acad. Sci. 12: 179, 1923.

A short headed species conspicuously marked with black and white. Length 3 mm.

Vertex almost twice as wide between eyes as median length.

Color: Vertex white, a broad transverse black vitta just before the eyes, consisting of approximate longitudinal lines. Two minute dashes either side the apex and three longitudinal lines connecting them with the transverse vitta. Base of vertex sometimes tinged with fuscous. Pronotum black irrorate with white forming a transverse vitta between the eyes. Scutellum fulvous or almost salmon pink, basal angles and usually some dots near apex and median line at base, black. Elytra ivory white, heavily inscribed with fuscous or black, when in normal position showing a trilobate basal vitta on clavus, a large annulus on middle of commissure, a large angular spot at its apex and about six oval or round spots on disk, white. Costa mostly white. Face white, sparsely irrorate between the antennae and at base.

Genitalia: Female last ventral segment slightly sinuated either side the blunt median point. Male valve broadly rounded at apex. The plates triangular, as long as pygofers, obtuse at apex.

This species was described from specimens collected at Cerralbo Island, San Jose Island, Carmen Island and Espirita Santo Island, Gulf of California. A female specimen has been available for study but no male has been dissected or studied.

***Cloanthanus heldoranus* (Ball)**

Nasutoideus heldoranus Ball Can. Ent. 63: 226, 1931.

A white to pale gray species with a large black spot surrounding the small white spot at apex and with narrow black lines extending from the posterior margin of the black spot on to disc or across vertex to pronotum.

The pronotum and elytra are white with a few ramose pigment lines or marks. The scutellum is pale yellowish. The face is pale yellow with faint markings just beneath margin of vertex.

Genitalia: Female last ventral segment with the posterior margin almost truncate, central position slightly produced. Male plates elongate, triangular. Style broadened at base gradually narrowed to about half its width then abruptly narrowed on outer margin to form a long narrow finger-like projection on inner margin of apical fourth. Aedeagus with a ventral pair of long slender processes reaching to apex of pygofer and curved ventrally at apex. Dorsal process short. Base broadened, from which the main shaft extends caudally a short distance then curves dorsally an equal length with apex truncate.

The only available record for Mexico is a male specimen taken on the high desert at Tasquilla, Hidalgo, Mexico, 5600 feet elevation, October 29, 1941, by E. E. Good and the author.

***Cloanthanus libramentus* n. sp.**

In form and general appearance resembling *heldoranus* but with more black markings on vertex and with distinct genitalia. Length 4 mm.

Vertex strongly produced and bluntly angled one-third longer on middle than basal width between eyes.

Color gray with dark markings. Apex of vertex covered with a black spot which is divided at tip by a short white longitudinal spot. There is another large black spot between eyes which almost forms a transverse band. These two large black spots are joined by longitudinal markings on middle. Pronotum with scattered dark spots and blotches. Scutellum bright yellow with the basal angles and apex marked with brown spots. Elytra almost white with veins and scattered ramose pigment lines brown. Face yellowish with brownish infuscations in two transverse rows just beneath apex of vertex.

Genitalia: Female last ventral segment with posterior margin truncate. Male plates triangular. Style narrowed near apex to form a finger-like process on inner margin which is short, not more than one-fifth of style and which curves outwardly. Aedeagus with a pair of rather narrow, long ventral processes almost as long as pygofer. Dorsal process long, narrow, sickle-shaped with a rather long base which extends ventrally curving back upon itself to extend dorsally and thus form a ventral loop.

Holotype male, allotype female and male and female paratypes collected at Acapulco, Gro., Mexico, September 10, 1939, by C. C. Plummer and the author from semi-desert vegetation on the steep slopes of the coastal range near sea level. Paratypes are also at hand from Iguala, Gro., Mexico, 3600 feet elevation, taken from semi-desert and one paratype from Colima, Colima, Mexico, elevation 1600 feet, collected January 27, 1930.

Cloanthanus albocephalus n. sp.

In coloration and general appearance resembling *bicolor* but with distinct genitalia. Length 4-4.5 mm.

Vertex appearing rather sharply angled, one-third longer at middle than basal width between eyes.

Color: Vertex and face white, washed with pale yellow. Pronotum, scutellum and elytra black. Costal margin with elongated white bars between costal veinlets. A white dash on posterior anteapical cell and a minute white dot on basal portion of each apical cell.

Female last ventral segment with posterior margin produced, slightly notched at apex. Male plates rather short, triangular, styles rather short and broad, heavily roundedly notched on outer margin near apex forming an apical curved finger-like process which is convexly curved, with apex directed outwardly. Aedeagus with a pair of narrow processes arising at base where they are proximal, gradually diverging at half their length and extending about half the length of pygofer. A central process attaches at more than half their length and extends beyond the apices of the lateral processes. It is enlarged at base with a dorsal spur and a ventral slender process which curves ventrally then apically and dorsally. In lateral view this process appears cleft at apex.

Holotype male and allotype female collected at Tamazunchale, S.L.P., Mexico, by E. E. Good and the author. These were collected at 700 feet elevation from rank growth along the dense rainforest a few feet above the Moctezuma River in the mountain valley. It has not been collected in any other habitat.

Cloanthanus goodi n. sp.

In form and general appearance resembling *osborni* but with different coloration and distinct genitalia. Length 4.5 mm.

Vertex bluntly angled, about one-fifth longer at middle than basal width between eyes.

Color: Vertex, pronotum and scutellum brown with few pale markings the most conspicuous of which is the apical half of scutellum which is white with a black spot just in front each side on basal angle. Paler spots just before eyes and at apex and base of vertex and a pale blotch just back of each eye on pronotum. Elytra with brown veins and peppered brown irrorations, apical margin and portions of costal margin white. Face pale rather heavily irrorate with brown. Lorae, genae and clypeus white.

Genitalia: Female last ventral segment with posterior margin gradually produced to middle where it is rather deeply incised forming a pair of oppressed teeth. The posterior margin is broadly black margined. Male plates short, broad, strongly convexly rounded, apices blunt. Style short

with apical finger-like process thick and almost one-third the length of entire style, curved outwardly. Aedeagus with a pair of slender ventral processes which are shorter than the pygofer. The dorsal process is rather large "L" shaped but irregular in form. The basal portion of the "L" is heavy and curved.

Holotype male and allotype female collected at Mexcala, Guerrero, Mexico, October 27, 1941 (K.247, elevation 2100 feet) from semi-desert vegetation in the Mexcala River Valley, by E. E. Good and the author. I take pleasure in naming this species in honor of E. E. Good who has proven to be an excellent collector and naturalist.

***Cloanthanus duocolorus* n. sp.**

In general appearance resembling *acutus* with a longer more sharply pointed vertex and with distinct genitalia. Length 4-4.5 mm.

Vertex strongly produced and sharply angled, not quite twice as long at middle as basal width between the eyes.

Color: Vertex brown with few markings. Usually a slender pale longitudinal line on apex and a longitudinal line extending from margin to base at about the middle on either side. Pronotum dark brown with five slender longitudinal pale stripes. Scutellum with basal angles orange, median portion orange yellow. Elytra irrorate with brown forming many pale areas. Veins and costal veinlets dark brown. Face bright yellow broadly bordered above with brown.

Genitalia: Female last ventral segment broadly roundedly produced on posterior margin. Male plates long, gradually narrowed to blunt apices. Style long and slender, narrowed at a little more than half its length to form a long straight, apical process. Aedeagus with a pair of long slender ventral processes which are about as long as pygofer. The dorsal process is hook-like and curves caudally then dorsally.

Holotype male, allotype female, and male and female paratypes collected at Tuxpan, Mich., Mexico, elevation 4000 feet, October 5, 1941.

Paratype males and females are also at hand from Tepetzlan, Mor. Mexico, October 11, 1941; Zamora, Mich., Mexico, elevation 5800 feet, October 2, 1941, Urapan, Mich., Mexico, elevation 5300 feet, October 1, 1941, Carapan, Mich., Mexico, elevation 7200 feet, September 30, 1941, Lake Chapala, Jal., Mexico, elevation 5000 feet, October 3, 1941, Jiutepec, Mor., Mexico, elevation about 3500 feet, September 6, 1939; Cuernavaca, Mor., Mexico, elevation 4900 feet, September 8, 1939; Mexico City, D.F., Mexico, elevation 7500 feet, November 16, 1936 and Chilpancingo, Gro., Mexico, elevation 4400 feet, October 25, 1941, all collected by C. C. Plummer, J. S. Caldwell, E. E. Good and the author.

***Cloanthanus brevis* (V.D.)**

Platymetopius brevis V.D. Bull. Buf. Soc. Nat. Sci. 8: 66, 1907.

A short blunt headed species with orange markings on a white vertex and with an orange scutellum. Length 4 mm.

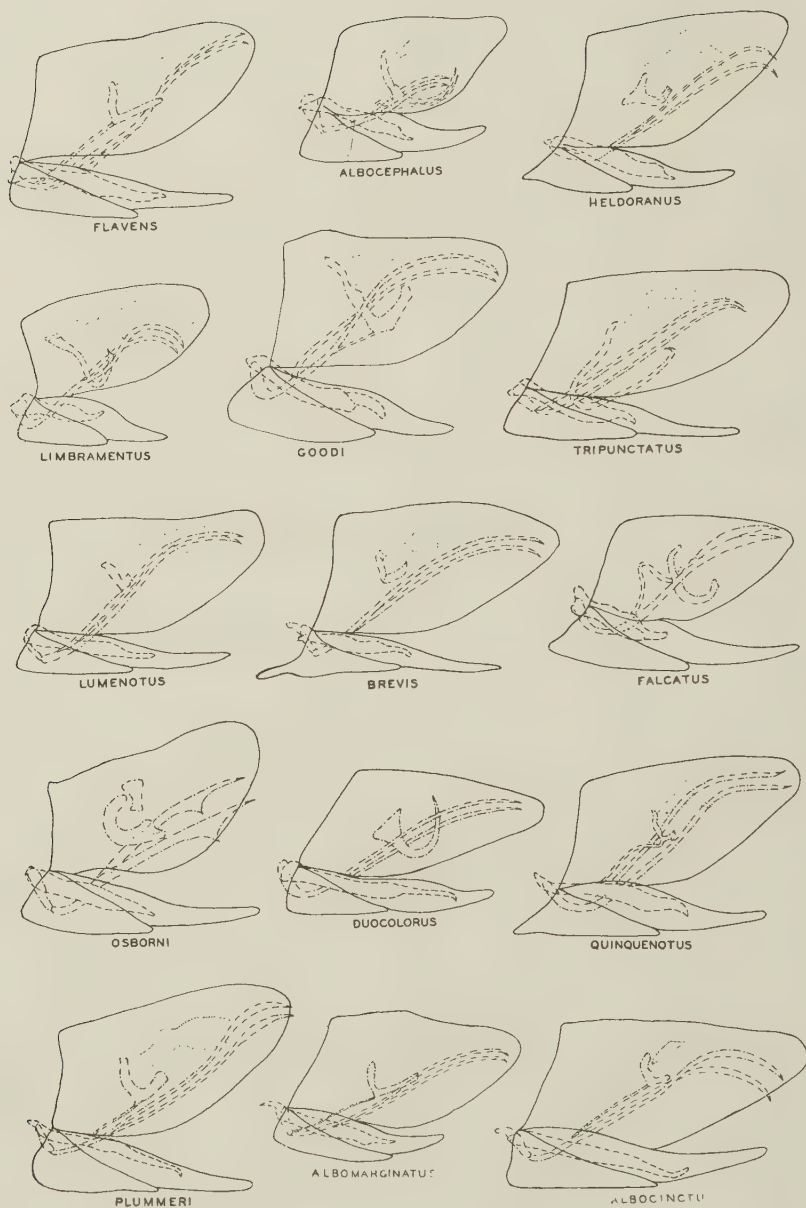


PLATE III. Lateral view of tip of abdomen of the males of species as designated.

Vertex, short, blunt, almost rounded as long at middle as basal width between eyes.

Color, vertex white with a broad orange transverse band between anterior margins of eyes with a central tooth-like portion extending forward on to vertex. Pronotum dark brown with faint traces of pale longitudinal lines. Scutellum orange. Elytra white with brown veins and scattered irrorations. Face yellowish irrorate with brown.

Genitalia: Female last ventral segment with posterior margin almost truncate, broadly slightly concavely emarginate. Male plates rather elongate with blunt apices. Style narrow and elongate. The apical finger-like process is about one-fourth the length of entire style and is bent outwardly. Aedeagus with a pair of long slender needle-like processes which extend to apex of pygofer. The dorsal portion is small "L" shaped with both portions of the "L" short but about equal in length.

This was originally described from specimens from Jamaica. Specimens are at hand collected at Iguala, Guerrero, Mexico, elevation 2500 feet, September 11, 1939, and October 25, 1941, from the high semi-desert, by C. C. Plummer, E. E. Good and the author. A series of specimens was also collected from the same type of habitat at Tehuacan, Pue., Mexico, elevation 7000 feet, October 17, 1941, by C. C. Plummer, J. S. Caldwell, E. E. Good and the author.

***Cloanthanus quinquenotus* n. sp.**

In general form resembling *brevis* but with longer produced vertex and different coloration. Length 4 mm.

Vertex bluntly angled, about one-fourth longer on middle than basal width between the eyes.

Color: brown with five white spots above margin of vertex one at apex, one next each eye and another about half way between these on either side of apex. Pronotum brown, scutellum with basal angles and apex slightly darker than disc. Elytra pale with brown veins and scattered brown irrorations. Face rather heavily irrorate with brown with three white spots just beneath margin and a median white dash a little below margin.

Genitalia: Female last ventral segment with posterior margin broadly roundedly produced. Male plates concavely narrowed to blunt apices. Style with apical finger-like process very short, not more than one-sixth the length of entire style, curved outwardly. Aedeagus composed of a pair of slender ventral processes which are shorter than pygofer and a small dorsal "L" shaped process with the basal portion short and thick.

Holotype male, allotype female and male and female paratypes collected at Iguala, Guerrero, Mexico, October 25, 1941, elevation 2500 feet, from the high semi-desert, by E. E. Good and the author.

***Cloanthanus lumenotus* n. sp.**

Closely related to *quinquenotus* but with different coloration and male genitalia. Length 4 mm.

Vertex bluntly angled, about one-fourth longer at middle than basal width between eyes.

Color: Vertex brown with a white spot at apex, a large black spot on margin next each eye encircling a tiny black spot, and base between eyes white. A few narrow longitudinal lines on disc white. Pronotum brown with conspicuous white longitudinal lines. Scutellum orange. Elytra pale with brown lines and scattered brownish spots. Face heavily irrorate with brown. A series of white spots just beneath margin and a transverse median white dash a little below margin.

Genitalia: Female last ventral segment with posterior margin almost truncate and sinuate. Male plates elongate, apices blunt. Style long and narrow, the finger-like process at apex about one-fifth the length of entire style, curved outwardly. Aedeagus with a pair of long slender needle-like processes which extend almost to tip of pygofer. Dorsal portion of aedeagus small "L" shaped with the base of the "L" both short and broad.

Holotype male and allotype female collected from plants of the high semi-desert at Ixmiquilpan, Hidalgo, Mexico, elevation 5800 feet, September 1941, by J. S. Caldwell, E. E. Good and the author. Male and female paratypes were collected at Iguala, Guerrero, Mexico, from high semi-desert September 11, 1939, by C. C. Plummer and the author.

***Cloanthanus falcatus* n. sp.**

In form and general appearance resembling *lumenotus* but different in color and with distinct male genitalia. Length 4 mm.

Vertex bluntly angled about one-fifth longer at middle than basal width between eyes.

Color: Vertex brown with a small white spot at apex and a large triangular spot just before eye extending from margin to disc and enclosing a tiny brown spot at middle on margin. Pronotum brown with five conspicuous white longitudinal stripes. Scutellum orange with median third pale. Elytra pale with brown veins and scattered brown irrorations. Face heavily irrorate with brown. A series of pale spots just beneath margin of vertex.

Genitalia: Female last ventral segment with posterior margin strongly produced, concavely rounded either side of a produced median tooth-like portion which is slightly notched at apex. Male plates long, rather gradually narrowed to pointed apices. Style short, broad at base, apical finger-like process short and strongly curved outwardly. Aedeagus with a pair of rather heavy ventral processes which extend to apex of pygofer and are widened to form blades on apical fourth. The dorsal portion is shaped like the blade of a sickle with the concavity upward.

Holotype male and allotype female collected at Santa Engracia, Tamaulipas, Mexico, elevation 1200 feet, November 11, 1938 by J. S. Caldwell.

***Cloanthanus plummeri* n. sp.**

In form and general appearance resembling *brevis* but with distinct coloration and male genitalia. Length 4 mm.

Vertex short, blunt, almost rounded, slightly wider between eyes at base than median length.

Color: Vertex pale, almost covered by a transverse orange band between the eyes, extending forward on middle to apex. A white spot anterior to each eye on margin and white on base. Pronotum dark brown with pale longitudinal lines. Scutellum orange. Elytra banded with dark brown spots, so as to form a narrow white band at base, another across middle of clavus and a broader white band just before apex. Face pale, only sparsely irrorate with brown.

Genitalia: Female last ventral segment with posterior margin broadly, roundedly produced. Male plates triangular, bluntly angled. Style abruptly, deeply notched to form apical finger-like process which is more than one-fourth as long as entire style, is bent and curved outwardly. Aedeagus with a ventral pair of rather long slender processes which extend almost to the apex to form narrow blades. Dorsal portion of aedeagus rather small and "L" shaped with the base of the "L" pointing caudally and convexly rounded.

Holotype male Iguala, Guerrero, Mexico, elevation 2500 feet, September 11, 1939, and allotype female from Chilpancingo, Guerrero, Mexico, elevation 4600 feet, September 10, 1939. Paratype males are from both localities all collected by C. C. Plummer and the author. I take pleasure in dedicating this species to Dr. C. C. Plummer.

***Cloanthanus albocinctus* n. sp.**

In form resembling *brevis* but with white vertex, banded elytra and distinct genitalia. Length 4 mm.

Vertex short, blunt, almost rounded, length at middle equalling basal width between eyes.

Color: Vertex white with a narrow, broken faint orange band between anterior margins of eyes. A black dot either side of apex on margin, and a black spot at base either side of middle. Pronotum dark on anterior half, paler on posterior half. Scutellum orange with disc paler. Elytra white with a broad band of brownish spots across base of clavus just posterior to apex of scutellum and a narrower band across apex of clavus, thus forming three white bands across elytra. Face pale with brownish irrorations on lower portion forming a large white area just beneath margin for its entire width.

Genitalia: Male plates elongate, blunt at apex. Style long and slender. The apical one-sixth is a finger-like process which is sharply bent outwardly. Aedeagus with a ventral pair of slender processes which are slightly widened on apical one-fourth. The dorsal portion is a small "L" shaped process with the base shorter than the upright portion.

Holotype male, allotype female and male and female paratypes collected from semi-desert vegetation at Iguala, Guerrero, Mexico, elevation 2500 feet, October 25, 1941, and September 11, 1939, by E. E. Good, C. C. Plummer and the author.

***Cloanthanus analis* (V.D.)**

Platymetopius analis V.D. Proc. Calif. Acad. Sci. 12: 181, 1923.

A small white species dotted with fuscous with yellow scutellum and fulvous head. Length 3.5 mm.

Vertex a little longer than width between the eyes. Apex blunt and up-turned.

Color: Vertex pale fulvous yellow, tinged with brown about eyes and becoming yellow at apex, on front and clypeus. Base of front with a few minute scattered brown dots. Pronotum yellow, basal angles darker. Pronotum and elytra white, irregularly dotted with small brown points, commissure with two pairs of points beyond the clavus. Beneath varied with white and yellow.

Genitalia: Female last ventral segment slightly produced either side of a small acute median notch; the lateral angles produced in a rounded lobe.

This species was described from a single female taken on Catalina Island in the Gulf of California. No material has been available for dissection.

***Cloanthanus retusus* (V.D.)**

Platymetopius retusus V.D. Proc. Calif. Acad. Sci. 22: 123, 1937.

Head scarcely as wide as pronotum. Vertex rounded-subangulate scarcely longer at middle than next the eyes and about as long as basal width between the eyes.

Color: dull fulvous brown, paler on base and apex of vertex and on inner angle and part of costal area. Vertex pale at apex and on basal margin. Pronotum darker anteriorly, median line and lateral angles paler. Scutellum pale yellow the base interruptedly fuscous. Elytra with a large fuscous commissural area, broken by a pale band before the apex and enclosing a round pale spot a little before the pale band. Costal reflexed veins heavy. Inner apical areole pale, with a sagitate fuscous mark at apex. The adjoining areole fuscous with a large white central area. Third areole fuscous with a round white dot at base and a yellowish marginal line. Fourth

areole soiled white next the stigmal area. The three antepical areoles each have a round white dot at apex.

Genitalia: Male valve long, rounded at apex. Plates exceeding valve by about its length, apices obtuse.

This was described from a single male specimen from Indefatigable Island which has not been available for study.

***Cloanthanus cinctus* n. sp.**

A blunt headed dark brown species with a yellow vertex and a yellow band across base of elytra and scutellum. Length 4 mm.

Vertex bluntly produced, a little wider between eyes than median length.

Color: Vertex white, tinged with bright yellow between eyes. Pronotum dark brown, a yellowish transverse band between eyes just back of anterior margin. Elytra uniform dark brown with a pale yellow band across their bases which crosses posterior portion of scutellum. The anterior third of scutellum is brown. Face white between eyes just beneath margin of vertex, lower two-thirds and clypeus brown.

Genitalia: Female last ventral segment with posterior margin broadly roundedly produced.

Holotype female collected at Fortin, Vera Cruz, Mexico, October 9, 1941, by C. C. Plummer, J. S. Caldwell, E. E. Good and the author.

The holotype specimen was collected from a mixture of luxuriant vegetation along a dense wooded area at an elevation of 2500 feet. Although no male has been found the coloration is so unique and different from allied species that it seems advisable to describe it from a single female.

***Cloanthanus osborni* (V.D.)**

Platymetopius osborni, V.D. Ann. Ent. Soc. Amer. 8: 229, 1910.

A blunt headed species with mottled elytra. Length 4.5 mm.

Vertex blunt, almost rounded, about as long at middle as basal width between eyes.

Color: Vertex reddish brown with a white dot at apex and a white spot either side almost forming a white band back of apex. Base of vertex white. Pronotum brown, mottled, with fine, conspicuous, pale, longitudinal stripes. Scutellum brown, mottled with white. Elytra white with rather dense brownish irrorations which form round areolar spots and white areas between the brown costal veinlets. Face pale, coarsely and heavily irrorate with brown.

Genitalia: Female last ventral segment with posterior margin rather broadly, roundedly produced. Male plates elongate, triangular. Style with

apical finger-like process about one-fourth the length of entire style and curved outwardly. Aedeagus with a pair of long heavy ventral processes almost as long as pygofer, broadened to form a blade near apex with a broad tooth like spine on ventral margin. Dorsal portion of aedeagus composed of a curved, semi-circular, tubular process with the ends directed dorsally and caudally.

This species was originally described from specimens taken at Los Amates, Guatemala. This species is apparently associated with the luxuriant rain forest type of vegetation and has been taken in Mexico only from that association. Additional records are at hand from Tamazunchale, S.L.P., Mexico, elevation 500 feet, September 14, 1939, collected by the author, Fortin, V.C., Mexico, elevation 2500 feet, October 9, 1941, and Orizaba, V.C., Mexico, elevation 2500 feet, October 8, 1941, collected by C. C. Plummer, J. S. Caldwell, E. E. Good and the author.

***Cloanthanus albomarginatus* n. sp.**

A short blunt headed species related to *brevis* but with black and white coloration and distinct male genitalia. Length 3.5 mm.

Vertex short, blunt, slightly longer at middle than basal width between eyes.

Color: Vertex white with a pair of minute black points just back of apex and a faint transverse orange band between anterior margins of eyes. Pronotum black, unmarked. Scutellum white with orange markings on basal angles. Elytra black, costal margin broadly white with a few dark costal veinlets, a narrow white margin along scutellum and commissural line of clavus, a broad white lobate spot on appendix and posterior apical and anteapical cells. Face white with a few black and brown peppered spots.

Female last ventral segment almost truncate, slightly broadly produced. Male plates elongate, triangular; styles elongate, strongly excavated on outer margin near apex so that apical fifth is produced as a narrow finger-like process on inner margin. Aedeagus with a ventral pair of long slender processes extending the length of the pygofer and a single dorsal process which is "L" shaped, the short portion of the "L" is directed dorsally and the long part apically.

Holotype male and paratype males collected at Iguala, Guerrero, Mexico, elevation 3000 feet, September 1939, by Dr. C. C. Plummer and the author. Female allotype from the same locality collected in October 1941, by E. E. Good and the author. The fact that records are from Iguala only and the few specimens collected indicate that this is a semi-desert species occurring at a 2500 to 3500 foot elevation. It may prove to be more generally distributed by more extensive collections.

Scaphytopius elegans (V.D.)

Platymetopius elegans V.D. Ent. Amer. **6**: 94, 1890.

Scaphytopius floridanus Ball Can. Ent. **63**: 220, 1931.

Pale brown with a broad pale yellow longitudinal stripe from apex of vertex to apex of clavus. Length 4.5–5 mm.

Vertex blunt at apex, almost twice as long at middle as basal width between eyes at base.

Color: pale brown, vertex margined with black anteriorly, a narrow pale median stripe at apex merging with a broad pale yellowish longitudinal stripe which extends from near apex of vertex across pronotum, scutellum and clavus of elytra to apex of clavus. The stripe includes the entire scutellum. Elytra brownish subhyaline costal veins brown. Face dull yellow with a brown line above, leaving a narrow pale marginal band between the two parallel dark lines.

Genitalia: Female last ventral segment rather broadly, roundedly, produced on posterior margin. Male styles with short, thick apical processes which are curved outwardly. Aedeagus short and rather broad, with a pair of rather heavy divergent finger-like processes at apex.

This species is known from California, Arizona and Florida. In Mexico it has been taken in the Oak association at elevations ranging from 5000 to 6500 feet.

It has been impossible to separate *elegans* and *floridanus* by structural characters and the genitalia are identical in form.

A New Male Legionary Ant from the Mojave Desert, California

MARION R. SMITH

(Bureau of Entomology and Plant Quarantine, Agricultural Research Administration,
United States Department of Agriculture)

In a previous article entitled, "The Legionary Ants of the United States Belonging to *Eciton*, subgenus *Neivamyrmex* Borgmeier" (1942, Amer. Mid. Nat. 27: 537-590), the author taxonomically reviewed all the species then known to occur in the United States. In the same article it was also indicated that additional species new to science would undoubtedly be found in the general southwestern region where the ants seem to be most abundant.

This article describes the male of a new legionary ant from the Mojave Desert, Calif. Although the male bears a striking superficial resemblance to that of *E. (N.) minus* (Cress.), it is specifically distinct, as the description and figure will confirm. Unfortunately, no facts are available concerning the exact ecological habitat of this ant.

***Eciton* (*Neivamyrmex*) *mojave*, new species**

(Fig. 1, head)

Male.—Length 8.25 mm.

Head approximately one and one-half times as broad as long. Eye rather small, moderately convex, protuberant. Ocelli small, only slightly extending above the general surface of the head; summit of protuberance concave; lateral ocellus at least twice its greatest diameter from inner margin of eye. Region of head between eye and lateral ocellus appearing round when head is viewed anteriorly. Frontal carinae with a pronounced groove between them extending from posterior border of clypeus to anterior ocellus; each carina not forming a distinct ridge above an antennal socket. Antennal scape robust, approximately as long as combined length of first 3 funicular segments; all funicular segments except the first two distinctly longer than broad. Anterior border of clypeus approximately straight. Mandible moderately long, curved, tapering from base to apex and ending in an incurved point that is neither long nor unusually acute. Eye not occupying all of the side of the head, there being a small area between the border of the eye and the mandible and a much larger area posterodorsad of the eye. Region of head behind ocelli flat or weakly concave. Occipital flange lacking. Head, from above, much more produced behind the eyes than in *minus*. Thorax approximately one and one-half times as long as high, somewhat projecting above head; mesonotum slender, convex, bearing anteromedian and parapsidal lines. Epinotum, in profile, subtruncate or weakly concave. Legs unusually small. Anterior half of petiole with sharply margined sides; ventral surface with a prominent protuberance. Gaster slender, compressed,

with distinct constrictions between segments. Seventh gastric sternum (hypopygium) with 2 acute lateral teeth and a less acute median tooth.

Head shining; thorax and gaster appearing more subopaque because of the dense, short, closely appressed hairs; thorax more subopaque than



FIG. 1. Head of male of *Ecilon* (*Neivamyrmex*) *mojave*, new species.
Illustration by Mrs. Sara H. DeBord.

gaster. Punctuation somewhat concealed by the hairs, most distinct on the thorax, especially the mesonotum and pleura.

Hairs yellowish, short, dense; excluding head, much appressed on all parts of body except venter; on head longer and more erect, especially on clypeus and mandibles.

Head, thorax, and petiole dark brown, almost black; gaster light brown forming a distinct contrast with remainder of body. Wings very pale, with extremely light veins and distinct brown stigma.

Type locality.—Mojave Desert, Calif.

Holotype.—United States National Museum No. 56598.

The holotype and one paratype male were collected at the type locality on October 15, 1925, by J. M. Swaine. The paratype male differs from that of the holotype in its much darker head, thorax, and petiole (approximately black) and the infuscated base of the first gastric segment.

In the article previously mentioned this species would key out to *minus* (Cress.). Although the male superficially resembles that of *minus* in its general size, slender appearance, color of wings, and a few other characters, it is entirely distinct. It differs from *minus* in the shape of the head, smaller eyes and ocelli, more slender thorax, and structure of the antenna.

Two New Crayfishes of the Genus *Procambarus* from Mexico (Decapoda, Astacidae)

HORTON H. HOBBS, JR.

(Department of Biology, University of Florida, Gainesville, Fla.)

For several years past, groups of students and faculty members of the Department of Biology, University of Florida, under the leadership of Dr. A. F. Carr, Jr., have made collecting trips to Mexico by truck and car during the Christmas holidays. I was fortunate to be able to accompany one of these expeditions, in the latter part of December, 1939, and early January, 1940, which went as far south as Tehuacan in Puebla and Cordoba in Vera Cruz. While emphasis was placed on the collection of small mammals and herpetological specimens for the Museum of Comparative Zoology of Harvard University (which furnished a part of the funds for the trips), a considerable quantity of entomological and other invertebrate material was also obtained. Among the more interesting finds were two undescribed species of crayfishes belonging to the genus *Procambarus*—one (*P. tolteca* sp. nov.) collected from a small stream at Palitla, San Luis Potosi, the other (*P. rodriguezi* sp. nov.) taken in a cave near Hacienda Potrero Viejo, Paraje Nuevo, Vera Cruz.

For their companionship and aid in collecting these crayfishes I wish to express my appreciation to the following members of this collecting party: Dr. and Mrs. A. F. Carr, Jr., Dr. F. N. Young, Messrs. Leonard Giovannoli, L. J. Marchand, W. M. McLane, O. E. Frye, G. H. Pournelle, A. C. Chable, W. M. Beck, H. E. Schulz, W. L. Brudon, and O. W. Struthers.

Sincere thanks are also due Mr. and Mrs. Dyfrig McH. Forbes for their gracious hospitality and guidance during our stay at their hacienda at Potrero Viejo, Vera Cruz, and for sending me additional specimens of *P. rodriguezi*.

I also wish to thank Mr. Roscoe McLane who provided transportation for the party by lending us one of his trucks.

***Procambarus tolteca* sp. nov.**

Diagnosis.—Rostrum broadly lanceolate, without lateral spines; areola of moderate width (3.8 times longer than wide) with large crowded punctations (four or five in narrowest part); male with hooks on ischiopodites of the third and fourth pairs of pereopods; palm of chela with scattered tubercles somewhat irregularly arranged in two rows; no lateral spines on carapace; postorbital ridges terminating cephalad in strong tubercles. First pleopod with a decided shoulder on cephalic margin some distance from tip; cephalic process extends caudodistad along the caudolateral surface of the appendage, and is somewhat hidden distad by a large tuft of plumose

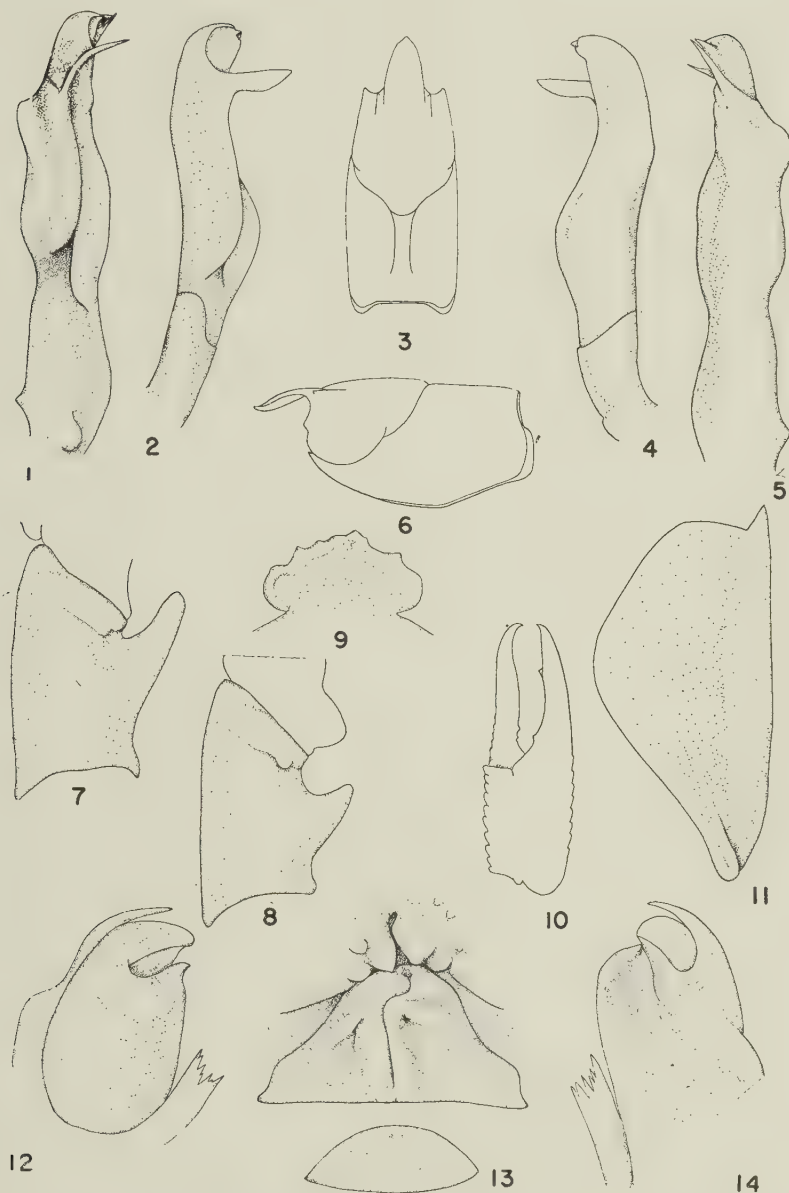


PLATE I.—*Procambarus tolteca*. 1. Mesial view of first pleopod of first form male. 2. Mesial view of first pleopod of second form male. 3. Dorsal view of carapace of male. 4. Lateral view of first pleopod of second form male. 5. Lateral view of first pleopod of first form male. 6. Lateral view of carapace of male. 7. Hook on ischiopodite of third pereiopod of first form male. 8. Hook on ischiopodite of fourth pereiopod of first form male. 9. Epistome of male. 10. Upper surface of chela of first form male. 11. Antennal scale of male. 12. Cephaloventral view of tip of first pleopod of first form male. 13. Annulus ventralis. 14. Caudodorsal view of tip of first pleopod of first form male.

Pubescence has been removed from all structures illustrated.

setae which extends in the same direction from the caudolateral surface. Cephalic portion of annulus ventralis hidden beneath the deeply cleft and tuberculate sternum just cephalad of it.

Holotypic Male, Form I.—Body subovate, strongly compressed laterally. Abdomen slightly narrower than thorax (.95–.99 cm. in widest parts respectively). Width of carapace less than depth in region of caudodorsal margin of cervical groove (.98–1.03 cm.).

Areola of moderate width (3.8 times longer than broad) with five punctations in narrowest part (punctations very large and crowded); cephalic section of carapace about twice as long as areola (length of areola about 33% of entire length of carapace).

Rostrum broadly lanceolate, excavate above, reaching middle of distal segment of peduncle of antennule; margins raised but not thickened; acumen not sharply set off but slightly upturned at the tip; upper surface of rostrum densely punctate at base, sparsely so cephalad; cephalic half smooth; however, a single row of setiferous punctations present along base of marginal ridges. Subrostral ridges poorly developed and not evident in dorsal aspect.

Postorbital ridges very strong, grooved, and terminating cephalad in heavy subacute tubercles. Suborbital angle obtuse; branchiostegal spine strong. No spines present on sides of carapace, instead there are two tubercles which are somewhat larger than those elsewhere on the carapace. Surface of carapace deeply punctate with a few scattered tubercles which are small and flattened.

Abdomen slightly longer than carapace (2.4–2.27 cm.).

Cephalic section of telson with two spines in each caudolateral corner.

Epistome broadly triangular with several emarginations on each of the two lateral spines; no well defined cephalomedian projection.

Antennule of the usual form with a well developed spine present on ventral surface of basal segment.

Antennae extend caudad to fourth abdominal segment. Antennal scale broad with a strong spine on outer margin; lamellar portion subangulate on cephalomesial margin, and distad of middle.

Chela weak, subovate, depressed, and studded with tubercles. Inner margin of palm with scattered tubercles arranged in two somewhat irregular rows of 8–10. Both fingers with a moderately well defined submedian ridge; that on the immovable finger stronger. Fingers not gaping. Opposable margin of dactyl with ten dome-shaped tubercles on proximal half, between and distad of which are crowded minute denticles. Lateral margin of dactyl with a weak ridge flanked proximad by setiferous tubercles and distad by setiferous punctations. Upper and lower surfaces each with a somewhat poorly defined submedian ridge flanked proximad by setiferous tubercles and distad by setiferous punctations; punctations near

tip of finger with strong pencils. Opposable margin of immovable finger with nine dome-shaped tubercles on basal three-fifths, and a much larger one extending from lower opposable surface at base of distal two-fifths; crowded minute denticles are present along entire surface. Otherwise the finger is similar to the movable one.

Carpus of first pereiopod about 1.4 times longer than broad; no distinct longitudinal furrow above; tuberculate except on mid-upper and lower surfaces; mesial surface with two large spike-like tubercles; upper mesiodistal margin with a single very large acute tubercle; lower distal and lower laterodistal margin each with a similar tubercle.

Merus punctate laterad and proximomesiad; tuberculate mesiodistad, as well as on upper and lower surfaces; lower surface with spike-like tubercles arranged in two well-defined rows, an inner one of 16 and an outer one of 10; these two rows are joined cephalad by an oblique row of three tubercles.

Hooks on ischiopodites of third and fourth pereiopods; hooks slender and somewhat weak. Bases of coxopodites of fourth and fifth pereiopods with ventrally projecting prominences; those on fourth larger, heavier, and directed more caudad; those on fifth compressed cephalocaudad and more acute.

First pleopod of first form male reaching coxopodite of third pereiopod when the abdomen is flexed. Tip terminating in four distinct parts. Mesial process long and spiculiform and directed at an 85 degree angle to the main shaft of the appendage. Cephalic process, also spiculiform, lies along the caudolateral side of the appendage and extends distad slightly beyond the other terminal elements. Caudal process corneous, prominent, and makes up the mesial portion of the tip of the outer part, and is directed at approximately a right angle to the main shaft of the appendage. Along with the caudal process the central projection is corneous and forms with the former a triangular projection which extends in a caudal direction. The central projection is extremely long in comparison with that in other related species because of the shifting of the position of the cephalic process laterad; as a result more of the proximal portion which is usually hidden from view is exposed. Cephalic margin with a decided shoulder some distance from tip. A conspicuous tuft of pulmose setae is present on the caudolateral surface along the basal portion of the cephalic process; while the tuft of setae is in normal position in relation to the cephalic process, since the latter has shifted it is certainly out of place in relation to the other apices, and presents one of the best diagnostic characters of the species.

Male, Form II.—Differing from the male, form I, in the following respects: (this specimen is definitely juvenile;) rostrum with margins interrupted near tip; postorbital ridges terminating cephalad in spines; ischiopodites of third and fourth pereiopods with only faint tubercles instead of

the hooks; chela smaller and much weaker, punctate rather than tuberculate. First pleopod with all processes reduced and non-corneous, only faintly resembling that of the first form male, see figs. 1, 2, 4, and 5.

Allotypic Female.—Differing from the first form male chiefly in the conformation of the chela which is stronger, broader, and had a distinct excavation along the outer margin of the hand at the base of the immovable finger.

Annulus ventralis partially hidden in ventral view by two flattened tubercular prominences projecting caudad from the sternum just cephalad of the annulus; a number of tubercles present in this region. Annulus broadly semi-oval with the caudal margin flattened; a strong transverse ridge present on either side of sinus at midlength; sinus originates on cephalic margin of midventral line, runs for a short distance caudad, emerges from beneath the sternum, and curves caudodextrad then caudad and slightly sinistrad, terminating a short distance cephalad of the caudal margin on the midventral line.

Measurements.—Male (form I) Holotype: carapace, height 1.03, width .98, length 2.27 cm.; areola, width .20, length .76 cm.; rostrum, width .38, length .52 cm.; abdomen, length 2.4 cm.; right chela, length of inner margin of palm .76, width of palm .66, length of outer margin of hand 1.95, length of movable finger 1.10 cm. Allotypic Female: carapace, height 1.40, width 1.34, length 2.88 cm.; areola, width .18, length .95 cm.; rostrum, width .50, length .67 cm.; abdomen, length 3.07 cm.; right chela, length of inner margin of palm .77, width of palm .66, length of outer margin of hand 2.00, length of movable finger 1.11 cm.

Type Locality.—A small, slowly flowing, clear rock bottomed stream about five miles north of Tomazunchale, at Palitla, San Luis Potosi, Mexico. Here the crayfish were very rare; a search for several hours netted only three adults and eight immature specimens. All of them except two of the immature ones were found hiding beneath stones, and these were found after dark in a small pool adjoining the stream.

Disposition of Types.—The male holotype, the female allotype, and an immature second form male are deposited in the United States National Museum; one female, two immature males, and five immature females are in my personal collection at the University of Florida.

Relationships.—The relationships of this species are not at all clear. The arrangement of the typical four terminals of the first pleopod resembles that of no other species; the lateral rather than mesial shifting of the cephalic process is exactly reversed from that found in other Mexican species of the genus.

The well exposed central projection of the first pleopod of the male has been observed elsewhere only in *P. acherontis*, a Floridian cavernicole; also the sterna and annuli ventralis of the females of the two species are similar.

I do not believe these similarities are necessarily indicative of close relationship, and in spite of these similarities, the affinities of *P. tolteca* seem to me to be with the members of the *digueti*, *barbatus*, and *blandingii* sections, having certain resemblances to members of each of these. The structure of the first pleopods and the presence of hooks on the ischiopodites of the third and fourth pereopods are in general like those found in members of the *blandingii* section, while the uninterrupted margins of the rostrum and the broad areola are *barbatus*- or *mexicanus*-like. The entirely tuberculate chela is also similar to that found in *mexicanus*.

***Procambarus rodriguezi* sp. nov.¹**

Diagnosis.—Albinistic or pale orange; eyes reduced with a small pigment spot; rostrum with small lateral spines; postorbital ridges terminating cephalad in spines; areola broad, polished, with scattered, very small dots; a small acute lateral spine on each side of carapace; hooks present on ischiopodites of third pereopods only; merus and carpus of first pereopods entirely tuberculate; first pleopod of male and annulus ventralis similar to those found in *Procambarus mexicanus*.

Holotypic Male, Form I.—This specimen, the only first form male taken, was slightly crushed; however, the damage done was not serious enough to ruin it.

Body subovate, slightly compressed laterally. Abdomen slightly narrower than thorax. Width of carapace slightly greater than depth in region of caudodorsal margin of cervical groove.

Areola relatively broad (4.6 times longer than broad) with minute punctations widely spaced over entire surface; surface polished; cephalic section of carapace about 1.7 times longer than areola (length of areola about 37.5% of entire length of carapace).

Rostrum broad at base with margins subparallel along basal portion, converging cephalad; acumen distinctly set off by lateral spines; rostrum reaching distal segment of peduncle of antennule; upper surface excavate with setiferous punctations; marginal ridges high but not swollen. Subrostral ridges moderately well developed but not evident in dorsal aspect.

Postorbital ridges considerably raised, only faintly grooved, and terminating cephalad in spines. Suborbital angle only faintly indicated, rounded; branchiostegal spine moderately well developed. A single spine present on each side of carapace. Surface of carapace decidedly granulate except on dorsal surface which is polished and furnished with scattered setiferous dots.

Abdomen and cephalothorax subequal in length.

Cephalic section of telson with two spines in each caudolateral corner.

¹ This species is named in honor of Señor Mario Rodriguez of Chapingo, Mexico, who was guiding the party when this new species was found.

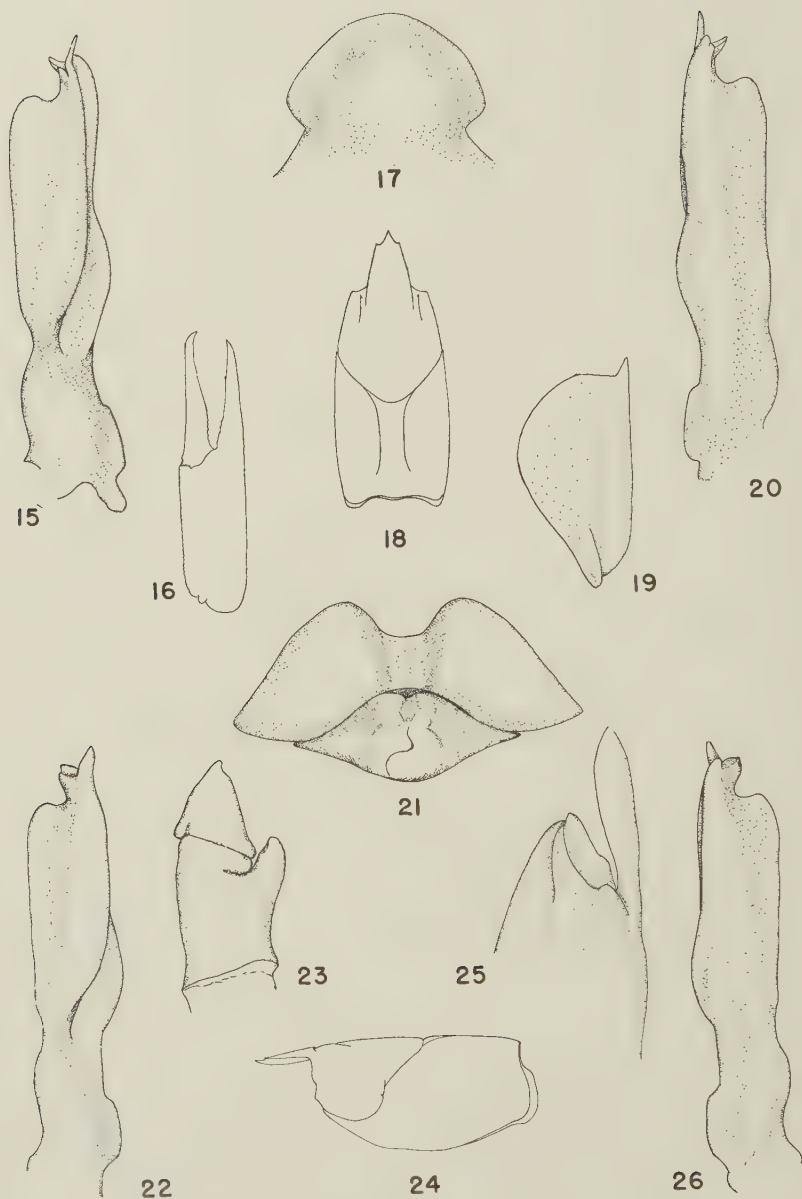


PLATE II.—*Procambarus rodriguezi*. 15. Mesial view of first pleopod of first form male. 16. Upper surface of chela of male. 17. Epistome of male. 18. Dorsal view of carapace of male. 19. Antennal scale of male. 20. Lateral view of first pleopod of first form male. 21. Annulus ventralis. 22. Mesial view of first pleopod of second form male. 23. Hook on ischiopodite of third pereopod of first form male. 24. Lateral view of carapace of male. 25. Cephalomesial view of tip of first pleopod of first form male. 26. Lateral view of first pleopod of second form male.

Pubescence has been removed from all structures illustrated.

Epistome subovate, margins gently rounded, a shallow broad emargination present on dextral cephalolateral margin; no cephalomedian projection present.

Antennules of the usual form with a strong spine on ventral surface of basal segment.

Antennae extend caudad to middle of telson. Antennal scale broad with a strong spine on outer margin; lamellar portion evenly rounded, broadest slightly distad of middle.

Chela long and slender, subovate, slightly depressed, and studded with hundreds of small tubercles. The crowded tubercles along the inner surface of the palm are not conspicuously larger than those elsewhere on the palm. Opposable margin of dactyl with five dome-shaped tubercles on basal fourth, distad of which are two rows of similarly shaped ones, and between which are crowded minute denticles; proximal half of outer surface tuberculate, distal half with setiferous punctations; upper and lower surfaces of finger with no well defined ridges, both tuberculate proximad and with setiferous punctations distad. Opposable margin of immovable finger similar to that of the dactyl; however, a large tubercle extends from lower surface at base of distal half; lateral surface with a groove bearing setiferous punctations running entire length of finger; upper and lower surfaces each with a poorly defined longitudinal ridge; all surfaces of finger tuberculate proximad and bearing setiferous punctations distad.

Carpus entirely tuberculate; only one conspicuously larger one on lower, cephalomesial margin.

Merus likewise entirely tuberculate; tubercles on upper distal and lower margins more spiniform; only one well defined row of 19 spike-like tubercles on lower surface.

Hooks on ischiopodites of third pereopods only; hooks long and moderately strong. Bases of coxopodites of fourth pereopods with extremely strongly developed prominences; those on fifth slender, compressed cephalocaudad, and conspicuous.

First pleopod of first form male, resembling that of *Procambarus mexicanus*, reaches base of third pereopod when the abdomen is flexed. A distinct shoulder present on cephalic surface a short distance from tip. Mesial process slender, subspatulate, and extending distad beyond the other terminal elements; cephalic process rudimentary, forming a slight prominence along the cephalomesial face of the tip; caudal process represented by a knob-like protuberance on the caudolateral surface of the tip; central projection corneous, subtriangular, compressed obliquely cephalocaudad and directed cephalodistad.

Paratypic Male, Form II.—Differing from the male, form I, in the following respects: Chela much weaker, decidedly narrower at base than at base of fingers; secondary sexual characters greatly reduced; first pleopod

with shorter terminals, and none of the apices distinct except the mesial process.

Allotypic Female.—Differs from the male, form I, chiefly in the smaller, weaker, and slenderer chelae.

Annulus ventralis (with a large, somewhat swollen, wing-shaped area cephalad traversed by a broad longitudinal groove) decidedly movable, tuberculiform, small; sinus originates some distance caudad of cephalic margin on midventral line, curves caudosinistrad, makes a sharp turn to cross the midventral line where it turns caudodextrad to cut the caudal margin of the annulus slightly dextrad of the midventral line.

Measurements.—Male (form I) Holotype: carapace, height 1.38, width 1.5, length 3.33 cm.; areola, width .27, length 1.25 cm.; rostrum, width .52, length .77 cm.; abdomen, length 3.50 cm.; right chela, length of inner margin of palm 1.31, width of palm .67, length of outer margin of hand 3.06, length of movable finger 1.75 cm. Allotypic Female: carapace, height 1.35, width 1.37, length 3.11 cm.; areola, width .26, length 1.13 cm.; rostrum, width .50, length .72 cm.; abdomen, length 3.28 cm.; right chela, length of inner margin of palm 1.0, width of palm .48, length of outer margin of hand (immovable finger abnormal), length of movable finger 1.52 cm.

Type Locality.—A cave, four kilometers west northwest of the Hacienda at Potrero Viejo, Paraje Nuevo, Vera Cruz, Mexico. A small cave, out of which flowed a small stream, near the trail to La Caldera. The stream consisted of pools joined by shallow narrows, and the crayfish were found in water about four inches deep.

Disposition of Types.—The male, form I, holotype, the female allotype, and a second form male paratype are deposited in the United States National Museum. One male, form II, in the Museum of Comparative Zoology; two males, form II, one female, and three immature females are retained in my personal collection at the University of Florida.

Relationships.—Almost without doubt this species has closer affinities with *Procambarus mexicanus* than with any described crayfish. It may easily be distinguished from the latter by the absence of pigment, and reduced eyes. The presence of a small pigmented area in the eye is suggestive of only one other cavernicole of this genus, *P. lucifugus alachua*, from Alachua County, Florida (Hobbs 1940: 402),² but certainly this similarity should not be interpreted as indicative of close relationship, for indeed the relatives of *rodriguezi* are found within another section of the genus.

² Hobbs, H. H., 1940. Seven New Crayfishes of the Genus *Cambarus* from Florida with Notes on Other Species. *Proc. U. S. Nat. Mus.* 89 (3097): 387-423, figs. 14-22.

More New Fungi from Florida

WILLIAM A. MURRILL

(*Herbarium, Florida Agricultural Experiment Station, Gainesville, Fla.*)

Specimens here cited are permanently deposited in the herbarium of the Florida Agricultural Experiment Station, at Gainesville. The nomenclature is that used by the author in "North American Flora," but at the close of the paper certain species are transferred to genera more familiar to those using Saccardo. Capitals are employed only for personal names.

***Lactaria amarissima* sp. nov.**

Pileo convexo-subexpanso, 5-7 cm. lato, viscido, glabro, isabellino vel fulvo, amarissimo; lamellis adnatis, angustibus, sporis subglobosis, echinulatis, 7-9 μ ; stipite glabro, isabellino, 5-6 \times 1 cm.

Pileus convex to subexpanded, umbonate at times, gregarious to cespitose, 5-7 cm. broad; surface viscid, smooth, glabrous, uniformly isabelline or fulvous, margin even, entire; context pallid, unchanging, thickish, odor agreeable, taste not acrid but very bitter at once; lamellae adnate, some forked at the base, inserted, narrow, close, entire, pallid to slightly rosy-isabelline; latex scant, watery; spores subglobose, coarsely echinulate, hyaline, 7-9 μ ; stipe subequal, smooth, glabrous, concolorous, about 5-6 \times 1 cm.

Type collected by W. A. Murrill in low ground under laurel oaks in Sugarfoot, near Gainesville, Fla., Jan. 17, 1941 (*F* 20057). Not known outside of Sugarfoot.

***Lactaria avellanea* sp. nov.**

Pileo convexo-expanso, gregario, 3-5 cm. lato, glabro, sapore grato; lamellis adnatis, confertis, angustatis, albis; sporis globosis, echinulatis, 6-7 μ ; stipite albo, 3 \times 0.4-0.7 cm.

Pileus convex to expanded or slightly depressed, gregarious, 3-5 cm. broad; surface dry, glabrous, smooth, uniformly avellaneous, margin thin, fertile, even, entire, incurved on drying; context thin, white, unchanging, taste mild, odor not characteristic; lamellae adnate, arcuate, narrow, crowded, inserted, entire, white to pale-isabelline; latex white, scanty, unchanging, sweet; spores globose, white, 1-guttulate, ridged and conspicuously echinulate, 6-7 μ ; stipe tapering downward, smooth, glabrous, white, unchanging, about 3 \times 0.4-0.7 cm.

Type collected by W. A. Murrill in low ground under hardwood trees at Gulf Hammock, Levy Co., Fla., Sept. 10, 1939 (*F* 19987). Suggesting small hymenophores of *L. trivialis* but not at all viscid.

✓ **Lactaria Buckleyana** sp. nov.

Pileo convexo-depresso, 7-9 cm. lato, subtomentoso, castaneo-fulvo, lacte albo, grato; sporis ellipsoideis, $7-8 \times 5-6\mu$; stipite pruinoso, $4-5 \times 1-1.5$ cm.

Pileus convex to depressed, not umbonate, gregarious, 7-9 cm. broad; surface smooth, dry, subtomentose, uniformly dull-castaneous-fulvous, margin even, entire; context dull-whitish, odorless, aromatic when dried; lamellae adnate, narrow, medium distant, inserted, entire, pallid to dirty-rosy-isabelline; latex white, mild; spores broadly ellipsoid, roughly tuberculate, $7-8 \times 5-6\mu$; stipe subequal, rosy-isabelline, darker below, pruinose, $4-5 \times 1-1.5$ cm.

Type collected by West, Arnold and Murrill under an oak in Buckley's woods, on the Newberry Road west of Gainesville, Fla., July 12, 1938 (*F* 18000). Resembling *L. camphorata* but distinctly subtomentose. Mrs. Buckley and two of her children have assisted in collecting a number of fungi in the large grove adjoining their home.

✓ **Lactaria praeviscida** sp. nov.

Pileo convexo-depresso, 8-12 cm. lato, viscido, albido, piperato; sporis subglobosis, echinulatis, $8-10 \times 6-7\mu$; stipite albido, $3 \times 1.5-2$ cm.

Pileus convex to depressed or umbilicate, gregarious, 8-12 cm. broad; surface slimy-viscid, smooth, glabrous, sordid-white, becoming isabelline and at length ferruginous in streaks or all over, margin even, entire; context sodden-white, odor pleasant, taste mawkish and astringent, slowly somewhat acrid; lamellae slightly decurrent, arcuate, medium distant, rather narrow, inserted, entire, white; latex copious, white; spores subglobose to broadly ellipsoid, very echinulate, hyaline, $8-10 \times 6-7\mu$; stipe subequal, smooth, glabrous, sordid-white, spongy-stuffed, about $3 \times 1.5-2$ cm.

Type collected by West, Arnold and Murrill on the ground under a live-oak in Sugarfoot Hammock, near Gainesville, Fla., July 11, 1938 (*F* 18002). Very unattractive in the original condition and terrible in the herbarium, with all the dirt and trash such a slimy thing is apt to pick up.

Lactaria praezonata sp. nov.

Pileo convexo-depresso, gregario, 3-4 cm. lato, zonato, isabellino et badio; lamellis adnatis, confertis, subisabellinis ad albis; lacte alba, grata; sporis ellipsoideis, tuberculatis, $8-10 \times 7\mu$; stipite glabro, subbadio, $2.3 \times 0.3-0.6$ cm.

Pileus convex to depressed, gregarious, 3-4 cm. broad; surface moist, opaque, subscabrous, distinctly multizonate, the disk bay, narrow zones

paler bay, broad zones isabelline with a fulvous tint, margin even, entire, smooth, fertile; context thin, isabelline with a fulvous tint, odorless, mild; latex plentiful, white, unchanging, sweet; lamellae adnate, plane, inserted, close, narrow, entire, pale-isabelline, dull-purplish when bruised, white when dry; spores broadly ellipsoid, slightly yellowish, 1-guttulate, distinctly tuberculate, about $8-10 \times 7\mu$; cystidia none; stipe equal, smooth, glabrous, pale-bay, $2-3 \times 0.5 \times 0.6$ cm.

Type collected by W. A. Murrill near the edge of a pond partly shaded by evergreen oaks and loblolly pines in Sugarfoot, near Gainesville, Fla., Oct. 1, 1942 (*F 11900*). Not known from elsewhere.

***Lactaria torminosa glabra* var. nov.**

Margine glabro.

Agreeing with the typical form except for the absence of the marginal hairs so characteristic of the species in the north. There are some hairs in the zone just back of the margin, which are long and appressed, but they do not project.

Type collected by W. A. Murrill on a lawn under an evergreen oak in Gainesville, Fla., Oct. 7, 1938 (*F 18474*). *L. torminosa* is exceedingly abundant here, appearing in large numbers under evergreen oaks. I was at first nonplussed by its unusual size but a careful study of the plant in all stages at all seasons has convinced me that it is only a gigantic southern form and does not merit a distinct specific name. Marginal hairs are present as a rule but they are apt to become inconspicuous in the large hymenophores with age. The variety here described is an extreme case of hairlessness seen frequently.

***Russula albiduliformis* sp. nov.**

Pileo 5-7.5 cm. lato, albo, margine dein striato; sapore grato; sporis tuberculatis, hyalinis, $6-7 \times 5-6\mu$; stipite albo, $4-5 \times 0.5-1.2$ cm.

Pileus convex to depressed, gregarious, 5-7.5 cm. broad; surface moist, smooth, glabrous, uniformly milk-white, not peeling readily, margin striate with age; context white, mild, not becoming bitter or acrid; lamellae of medium width and distance, adnate, white, entire, many furcate at the base; spores broadly ellipsoid, tuberculate, uniguttulate, hyaline, $6-7 \times 5-6\mu$; stipe subequal, smooth, glabrous, white, stuffed, about 4-5 cm. long and 5-12 mm. thick.

Type collected by Erdman West and W. A. Murrill on the ground in oak woods at Gainesville, Fla., Nov. 9, 1932 (*F 9561*). A pure-white species of mild flavor. In *R. albida* the spores are subglobose, 8μ ; while in *R. albidula* the flesh is decidedly acrid.

***Russula alutaceiformis* sp. nov.**

Pileo convexo-depresso, 5.5 cm. lato, roseo-isabellino, sapore grato; lamellis albis, sporis cremeis, $8-9 \times 6-7\mu$; stipite albo, 5×1.5 cm.

Pileus convex to depressed, solitary, 5.5 cm. broad; surface slightly viscid, glabrous, rosy-isabelline, margin entire, slightly striate, peeling readily; context white, becoming slightly grayish, odorless, mild; lamellae adnixed, broad, ventricose, crowded, equal, entire, white to yellow; spores cremeous in mass, broadly ellipsoid, strongly echinulate, $8-9 \times 6-7\mu$; stipe equal, smooth, glabrous, white, unchanging, 5×1.5 cm.

Type collected by W. A. Murrill under an oak in Gainesville, Fla., June 3, 1938 (*F* 17703). The color is a mixture of pale-pink and pale-yellow, which dries pale-red, falsely suggesting an incarnate cap. In herbarium specimens the exposed flesh is not white but avellaneous.

***Russula Fosteriana* sp. nov.**

Pileo convexo-depresso, gregario, 6 cm. lato, glabro, rubro, acrido; lamellis adnatis, confertis; sporis ellipsoideis, cremeis, echinulatis, $8 \times 6\mu$; stipite glabro, albo, $2-3 \times 1$ cm.

Pileus convex to somewhat depressed, closely gregarious, about 6 cm. broad; surface slightly viscid when moist, smooth, glabrous, uniformly red, slightly purplish-red at times with age, margin even, entire, concolorous, not peeling readily; context thick, firm, white, unchanging, odor pleasant, taste distinctly acrid at once; lamellae adnate, some forked at or near the base, medium broad, close, entire, white to cream; spores broadly ellipsoid, moderately rough, 1-guttulate, cream in mass, about $8 \times 6\mu$; stipe mostly equal, smooth, glabrous, all white or partly reddish, usually $2-3 \times 1$ cm.

Type collected by W. A. Murrill under a laurel oak in Gainesville, Fla., July 4, 1942 (*F* 18609). Also collected by G. F. Weber near the same spot on the same date (*F* 18644). An attractive species with stipe so short that the caps seen from above often look like pure-red disks lying on the ground. Dedicated to Stephen Foster, who was born on Independence Day and wrote a song much beloved by Floridians.

***Russula furcatifolia* sp. nov.**

Pileo convexo-depresso, 5.5 cm. lato, viscido, purpureo, sapore grato; lamellis adnatis, angustatis, confertis, albis, furcatis; sporis albis, $7 \times 6\mu$, cystidiis subclavatis, $40-45 \times 6-10\mu$; stipite pallido, 5×1.3 cm.

Pileus convex to depressed, solitary, 5.5 cm. broad; surface viscid, smooth, glabrous, purple, darker at the center, margin even, not peeling readily; context thin, white, unchanging, inodorous, mild; lamellae adnate, narrow, close, white, unchanging, entire, often forked behind and near

the middle; spores subglobose, finely echinulate, 1-guttulate, white in mass, about $7 \times 6\mu$; cystidia frequent, narrowly clavate, acute at the tip, conspicuously granular, hyaline, projecting $40-45 \times 6-10\mu$; stipe curved, slightly tapering upward, uneven, mottled with grayish-white and hyphophanous streaks and blotches, unchanging, $5 \times 1-1.3$ cm.

Type collected by J. R. Watson and W. A. Murrill in leaf-mold under hardwood trees near a stream in the ravine at Goldhead Branch State Park, Clay Co., Fla., Jan. 7, 1940 (*F* 19270). Suggesting *R. subsericeonitens* Murrill and having cystidia resembling those of *R. subobscura* Murrill but many of the gills are forked near the middle as well as at the base.

***Russula glaucescentipes* sp. nov.**

Pileo convexo-depresso, 4 cm. lato, subpurpureo, sapore grato; lamellis adnatis, sporis globosis, albis, 7μ ; stipite albo, glaucescente, 2×0.8 cm.

Pileus convex to deeply depressed, solitary, 4 cm. broad; surface smooth, glabrous, slightly viscid, pale-purple, margin entire, very slightly striate, peeling readily; context thin, white, unchanging, sweet, odorless; lamellae adnate, ventricose, broad, crowded, equal, some forked at or near the base, white, entire, stramineous when dry; spores globose or subglobose, slightly tuberculate, chalk-white in mass, about 7μ ; cystidia none; stipe subequal, smooth, pulverulent at the apex, glabrous below, white, becoming distinctly glaucous over the whole surface after drying, about 2×0.8 cm.

Type collected by W. A. Murrill under an oak at Gainesville, Fla., Oct. 17, 1938 (*F* 18383). A small, rare species suggesting *R. variata* but the stipe becomes distinctly glaucous.

***Russula granulosa* sp. nov.**

Pileo convexo-depresso, 7 cm. lato, melleo vel vinoso-melleo, nigro-granulosulo; lamellis furcatis, stramineis; sporis globosis vel subglobosis, echinulatis, pallidis, $6-7\mu$; stipite albo vinosoque, 5×1.2 cm.

Pileus convex to depressed, scattered, 7 cm. broad; surface smooth, dry, melleous, often vinose-tinted, showing under a lens minute black adnate granules; margin deflexed, partly sulcate at times; context white, unchanging, sweet, odorless; lamellae slightly decurrent, forked at the base, broad in front, equal, distant, stramineous, edges finely fringed; spores globose or subglobose, coarsely reticulate, roughly echinulate, white or pale yellowish, $6-7\mu$; stipe equal, smooth, glabrous, 5×1.2 cm., white above and below, the center splashed with wine-color as though painted.

Type collected by West and Murrill on the ground in Planera Hammock, eleven miles northwest of Gainesville, Fla., July 20, 1938 (*F* 17907). A very striking species, peculiar in form and queerly colored.

***Russula Hixsoni* sp. nov.**

Pileo convexo-depresso, 15 cm. lato, roseo ad incarnato, grato; lamellis adnatis, latis, distantibus, pallidis ad fumosis; sporis ellipsoideis, echinulatis, stramineis, $10-12 \times 8-10\mu$; stipite albo, $7 \times 2-3$ cm.

Pileus convex to depressed, gregarious, 15 cm. broad; surface dry, smooth, glabrous, roseous to incarnate, margin thick, even, entire, not peeling readily; context thick, white, unchanging, mild, with very agreeable odor on drying; lamellae adnate, many forked at base, broad, ventricose, distant, firm, entire, pallid, becoming avellaneous to fumous on drying; spores broadly ellipsoid, prominently echinulate, 1-guttulate, stramineous, $10-12 \times 8-10\mu$; stipe nearly equal, smooth, glabrous, white, unchanging, $7 \times 2-3$ cm.

Type collected by Prof. Homer Hixson on a moist shaded slope near sweet gums west of Newnan's Lake, Alachua Co., Fla., Oct. 31, 1942 (*F 19081*). One of the largest and most beautiful species of the genus. While drying and for some time afterwards it smells like freshly baked cake.

***Russula levispora* sp. nov.**

Pileo convexo-depresso, 5-6 cm. lato, flavo vel luteo, sapore grato; sporis ellipsoideis, levibus, $7-9 \times 5-6\mu$, stipite albo, $4-5 \times 1.5$ cm.

Pileus convex to slightly depressed, solitary, 5-8 cm. broad; surface slightly viscid, glabrous, uniformly flavous or luteous, margin entire, even or slightly striate, not peeling; context thick, firm, white, unchanging, odorless, mild; lamellae adnate, close to medium distant, mostly equal, forked at the base, entire, white to stramineous; spores broadly ellipsoid, stalked, uniguttulate, stramineous in mass, smooth or very slightly roughened, $7-9 \times 5-6\mu$; stipe subequal, smooth, glabrous, white, solid, $4-7 \times 1.5-2$ cm.

Type collected by West, Arnold and Murrill on the ground in mixed woods of live-oak and pine at Magnesia Springs, Fla., July 15, 1938 (*F 17270*). Also near the same place on the same day (*F 17271*); and by W. A. Murrill under a live-oak in Gainesville, July 6, 1938 (*F 17449*). A beautiful, firm, yellow species with smooth spores.

***Russula maculosa* sp. nov.**

Pileo convexo-depresso, 5-7 cm. lato, albo, ferrugineo-maculoso, striato, sapore grato; sporis albis, $7 \times 5\mu$, stipite albo, $4 \times 1.5-2$ cm.

Pileus convex to expanded, slightly depressed, scattered, 5-7 cm. broad; surface dry, glabrous, smooth when young, long-striate in age, milk-white, becoming rusty-spotted with age, peeling readily; context thin, white, rusty-discolored where bruised, mild, odorless; lamellae adnate, plane, rather narrow, medium distant, very few inserted, many forked at the

base, entire, white, rusty when bruised; spores broadly ellipsoid, white, minutely echinulate, about $7 \times 5\mu$; stipe slightly tapering downward, finely ridged, glabrous, milk-white, solid, about $4 \times 1.5-2$ cm.

Type collected by West and Murrill in low woods in Prairie Creek Hammock, just south of Newnan's Lake, Florida, July 27, 1938 (*F* 17983). Resembling *R. lactea* but discolored with rusty spots and having smaller spores. Collected since by the author in low hammocks.

***Russula perlactea* sp. nov.**

Pileo convexo-plano, 7 cm. lato, glabro, albo, piperato; lamellis adnatis, latis, albis, sporis subglobosis, verrucosis, 9μ latis; stipite glabro, albo, 5×1.8 cm.

Pileus convex to plane or slightly depressed, somewhat gregarious, about 7 cm. broad; surface smooth, glabrous, slightly viscid, pure-white, unchanging, peeling readily, margin even, straight, entire; context rather thick, white, unchanging, odorless, distinctly acrid at once; lamellae adnate, broad, rather distant, very few forked, entire, white, unchanging; spores chalk-white in mass, subglobose or broadly ellipsoid, roughly verrucose, about 9μ broad; stipe equal, smooth, glabrous, solid, white, unchanging, about 5×1.8 cm.

Type collected by W. A. Murrill in leaf-mold under a laurel oak in low ground in Sugarfoot, near Gainesville, Fla., Jan. 28, 1941 (*F* 18572). Also collected by the author at the same time in a nearby rotten pine stump (*F* 18108) and on Feb. 9, 1941 in a pine stump at Wakahoota, Alachua Co. (*F* 21534).

***Russula pinicola* sp. nov.**

Pileo convexo ad plano, 6 cm. lato, roseo-melleo, sapore grato; sporis albis, globosis, spinulosis, $7-8\mu$; stipite albo, $5 \times 1-1.3$ cm.

Pileus convex to plane, solitary, 6 cm. broad; surface glabrous, melleous with a rosy tint, livid in the center, margin entire, partly striate for 5 mm. peeling with medium ease; context thin, white, drying grayish, odorless, mild; lamellae adnate, medium broad, close, inserted, entire, white, drying slightly brownish; spores chalk-white in mass, globose or subglobose, spinulose, $7-8\mu$; cystidia abundant, large, hyaline, triangular, abruptly needle-pointed; stipe subequal, smooth, glabrous, white, slightly brownish where bruised, $5 \times 1-1.3$ cm.

Type collected by West and Murrill in rotten pine wood at Sanchez Hammock, eleven miles northwest of Gainesville, Fla., July 23, 1938 (*F* 17950). The cystidia end abruptly in long, slender bristles.

***Russula praeclavipes* sp. nov.**

Pileo 10 cm. lato, viscido, vinoso; sapore acri; sporis subglobosis, hyalinis, echinulatis, $7-8\mu$; stipite albo, $10-12$ cm. longo.

Pileus becoming deeply depressed, not umbonate, gregarious, 10 cm. broad; surface smooth, glabrous, rather viscid when fresh, vinous, somewhat darker at the center, margin even, entire or lobed; context white, unchanging, slightly acrid at once, odor none; lamellae adnate, simple, equal, rarely inserted, of moderate width and distance, entire, white, cremeous with age; spores white in mass, subglobose, echinulate, uniguttulate, $7-8\mu$; stipe tapering upward, smooth, white, glabrous, hollow, 10-12 cm. long, 1.5-2 cm. thick above, 2-3 cm. at the clavate base.

Type collected by W. A. Murrill in wet humus in a low hammock at Gainesville, Fla., Feb. 6, 1938 (*F 16037*). A very large, striking plant with purple cap and swollen, milk-white stem. Also collected by the author on the ground under pines Dec. 1, 1926 (*F 15669*); and by Weber, West and Murrill Dec. 14, 1926 (*F 9563*). In these latter collections the stipe was less swollen than in the type. The species seems to prefer pines but will also grow in frondose woods.

***Russula praeformosa* sp. nov.**

Pileo convexo-depresso, 3.5 cm. lato, pruinoso-pulverulento, luteo flavoque; lamellis albis, sporis globosis, spinulosis, $6-7\mu$; stipite citrino, 4.5×1 cm.

Pileus convex to deeply depressed, solitary, 3.5 cm. broad; surface pruinose-pulverulent, luteous in the center and flavous on the wide margin, which is entire and slightly striate; context very thin, odorless; lamellae adnate, mostly equal, medium broad, crowded, entire, white; spores white or nearly so, globose, uniguttulate, finely spinulose, $6-7\mu$; cystidia none; stipe equal, smooth, subglabrous, citrinous, luteous at the base, 4.5×1 cm.

Type collected by West and Murrill on the ground under hardwood trees in Sanchez Hammock, eleven miles northwest of Gainesville, Fla., July 23, 1938 (*F 17269*). A very beautiful species, bowl-shaped at maturity and having a yellow-based stipe suggestive of *R. luteobasis* Peck.

***Russula praerubra* sp. nov.**

Pileo convexo-subplano, 7 cm. lato, purpureo-rubro, sapore grato; sporis globosis, albis, spinulosis, $6-8\mu$; stipite albo roseoque, $4 \times 1.5-2$ cm.

Pileus convex to almost plane, solitary, 7 cm. broad; surface smooth, glabrous, purplish-red, not peeling, margin even, entire; context firm, white, unchanging, odorless, mild; lamellae plane but broad, adnexed, equal, rather crowded, white, unchanging, the edges finely fimbriate; spores chalk-white in mass, globose or slightly subglobose, strongly spinulose, $6-8\mu$; stipe tapering downward, smooth, glabrous, white, pink below, solid $4 \times 1.5-2$ cm.

Type collected by West and Murrill in low ground under shrubs at Planera Hammock, eleven miles northwest of Gainesville, Fla., August 2,

1938 (*F* 17985). A very handsome, large, well-marked, red species with just enough purple to make it brilliant. Miss Burlingham once remarked that every red *Russula* should be destroyed the moment it was found. I consider this one an exception; it has *everything*.

***Russula praeurbriceps* sp. nov.**

Pileo convexo-depresso, 8 cm. lato, rubro, sapore grato; lamellis furcatis, sporis albis, globosis, $7-9\mu$; stipite albo, $5 \times 1.5-2$ cm.

Pileus convex to slightly depressed, solitary, 8 cm. broad; surface slightly viscid, smooth, glabrous, ruber, margin mostly even and entire, peeling readily; context white, unchanging, odorless, mild; lamellae adnate, without decurrent ridges, rather crowded, rather broad, equal, mostly forked at the base, entire, white; spores whitish in mass, globose or subglobose, strongly echinulate, $7-9\mu$; stipe tapering downward, smooth, glabrous, milk-white, unchanging, $5 \times 1.5-2$ cm.

Type collected by West and Murrill in low ground under hardwood trees at Planera Hammock, eleven miles northwest of Gainesville, Fla., August, 2, 1938 (*F* 17977). A truly red species with whitish spores and mild flesh.

***Russula praetenuis* sp. nov.**

Pileo convexo-depresso, 2-3 cm. lato, subviscido, incarnato, striato, sapore grato; lamellis adnatis, albis; sporis albis, echinulatis, $5-6 \times 4.5-5\mu$; stipite albo, $2-3 \times 0.5$ cm.

Pileus convex to depressed, 2-3 cm. broad; surface glabrous, viscid when wet, uniformly incarnate, margin entire, peeling readily, widely striate; context very thin, white, unchanging, mild, odorless; lamellae adnate, many forked at the base, ventricose, broad, medium distant, entire, white, unchanging; spores white, moderately rough, broadly ellipsoid, about $5-6 \times 4.5-5\mu$; cystidia none; stipe tapering downward, solid, smooth, glabrous, white with a faint blush on one side, unchanging, about $2-3 \times 0.5$ cm.

Type collected by W. A. Murrill in a grassy road through woods of red oak, hickory, etc. at Seven-mile Church, west of Gainesville, Fla., June 28, 1942 (*F* 21508). A small, beautiful species, evidently rare. It is much more dainty than *R. uncialis* Pk.

***Russula Rooseveltiana* sp. nov.**

Pileo convexo-subdepresso, gregario, 5-8 cm. lato, rubro, glabro, prae-acrido; lamellis adnatis, furcatis, confertis; sporis ellipsoideis, flavis, tuberculis, $8 \times 6\mu$; cystidiis $45 \times 12\mu$; stipite albo, glabro, $3.5 \times 1.5-2.5$ cm.

Pileus convex to slightly depressed, gregarious, 5-8 cm. broad, occasionally larger; surface slightly viscid when fresh, uniformly light-red, often fading to pink, margin even, entire, pellicle not separating; context firm,

medium thick, white, unchanging, very acrid at once, odorless; lamellae adnate, many forked at or near the base, crowded, medium broad, entire, white to cream, at length deep-yellow; spores broadly ellipsoid, uniguttulate, deep-yellow in mass, tuberculose, about $8 \times 6\mu$; cystidia abundant, flask-shaped, yellowish, about 12μ thick near the base, projecting about 45μ ; stipe slightly tapering downward, milk-white, unchanging, smooth, dry, glabrous, solid, about $3-5 \times 1.5-2.5$ cm.

Type collected by W. A. Murrill under loblolly pines at Camp Roosevelt, south of Ocala, Fla., Sept. 27, 1941 (*F 21510*). Also collected by the author at Planera Hammock, eleven miles northwest of Gainesville, Fla., in woods of red oak, hickory and pine, June 16, 1942 (*F 21890*). A beautiful, very acrid species with deep-yellow spores and abundant cystidia.

***Russula rosei-isabellina* sp. nov.**

Pileo convexo-depresso, 4.5-6 cm. lato, glabro, striato, sapore grato; sporis albis, globosis, $6-7\mu$; stipite albo, $4-6 \times 1-1.5$ cm.

Pileus convex to depressed, 4.5-6 cm. broad; surface glabrous, slightly viscid, the cuticle not readily separable, rosy-isabelline or isabelline, margin entire, somewhat striate; context rather thick, white, unchanging, sweet, odorless; lamellae adnate, narrow, close, entire, mostly equal, scarcely any forked, white to pallid, becoming brownish where bruised; spores white in mass, globose or subglobose, distinctly echinulate, $6-7\mu$; stipe tapering downward, smooth, glabrous, white, unchanging on drying but brownish where bruised, $4-6 \times 1-1.5$ cm.

Type collected under an evergreen oak on the west shore of the Prairie, near Gainesville, Fla., June 19, 1938 (*F 16365*). Also collected under oaks at the Tung-oil Mill, west of Gainesville, June 15, 1938, by Margaret Johnson (*F 17209*), and in the same locality, June 22, 1938, by West and Murrill (*F 17210*). This species seems to prefer soil with some lime in it. It is rare, and is found alone or, at most, two near together.

***Russula rubripurpurea* sp. nov.**

Pileo 4-5 cm. lato, rubro, centro purpureo; sapore grato; sporis globosis, hyalinis, tuberculatis, 7μ ; stipite albo, 3×1 cm.

Pileus convex to expanded, solitary, 4-5 cm. broad; surface dry, smooth, glabrous, red, purple toward the center, cuticle not separable, margin even, entire; context white, mild; lamellae adnate, equal, rather narrow and close, white, unchanging; spores white in mass, globose, tuberculate, about 7μ ; stipe equal, smooth, glabrous, white, 3×1 cm.

Type collected by W. A. Murrill on the ground in oak woods at Gainesville, Fla., Oct. 3, 1932 (*F 9514*). A pretty species with purple and red cap, white stipe and gills, and mild flavor.

***Russula subcyanoxantha* sp. nov.**

Pileo convexo-depresso, 4-5 cm. lato, sapore grato; lamellis albis, sporis cremeis, globosis, echinulatis, 5-6 μ ; stipite albo, 4 \times 1 cm.

Pileus convex to depressed, solitary, 4-5 cm. broad; surface slightly viscid, glabrous, olive-cream-purple, margin entire, slightly striate; context firm, thick, white, unchanging, odorless, mild; lamellae adnate with decurrent tooth, close to medium distant, mostly equal, entire, white to cream; spores globose, conspicuously echinulate, creameous in mass, 5-6 μ ; stipe subequal, smooth, glabrous, white, about 4 \times 1 cm.

Type collected by W. A. Murrill under an oak at the Tung-oil Mill, west of Gainesville, Florida, June 7, 1938 (*F* 17390). Also collected under oaks at various places near Gainesville (*F* 17266, *F* 17267, *F* 17385, *F* 17739). Suggesting *R. cyanoxantha* but much smaller and having different spores.

***Russula subfragiliformis* sp. nov.**

Pileo convexo-depresso, rubro, 5-8 cm. lato, sapore grato; lamellis flavis, sporis cremeis, globosis, 6-8 μ ; stipite albo vel roseo, 4 \times 1-1.5 cm.

Pileus convex to depressed, gregarious or solitary, 5-8 cm. broad; surface slightly viscid, smooth, glabrous, red or incarnate, margin entire, sometimes striate, peeling readily; context white, unchanging, odorless, mild; lamellae adnate, mostly equal, medium distant, rather narrow, entire, becoming deep-ochraceous; spores globose or subglobose, echinulate, 6-8 μ , creameous in mass; stipe subequal, smooth, glabrous, white or partly pink, unchanging, about 4 \times 1-1.5 cm.

Type collected by West, Arnold and Murrill on the ground under hardwood trees in Planera Hammock, eleven miles northwest of Gainesville, Fla., July 16, 1938 (*F* 17705). Also collected frequently in similar situations about Gainesville (*F* 17661, *F* 17662, *F* 17700). A beautiful red species with mild flesh and pale-yellow spores.

***Russula subglaucia* sp. nov.**

Pileo convexo-depresso, 5-6 cm. lato, striato, subglauco, sapore grato; lamellis furcatis, albis, sporis ellipsoideis, levibus, albis, 6 \times 4 μ ; stipite albo, 6 \times 1.5 cm.

Pileus convex to depressed, gregarious, 5-6 cm. broad; surface slightly viscid, glabrous, finely long-striate, peeling readily, opaque-white with a distinct glaucous tint, margin rimose, entire; context thin, white, unchanging, odorless, mild; lamellae very slightly decurrent, narrow behind, nearly all forked at the base, all equal, very close, rather narrow, entire, white; spores broadly ellipsoid, smooth or slightly roughened, chalk-white in mass, about 6 \times 4 μ ; stipe equal, glabrous, white, unchanging, striate at the apex, 6 \times 1.5 cm.

Type collected by West and Murrill on the ground under oaks in Planera Hammock, eleven miles northwest of Gainesville, Fla., August 2, 1938 (*F 17781*). A pale-green, striate species with white spores and mild flesh.

***Russula subgraminicolor* sp. nov.**

Pileo convexo-depresso, 6–8 cm. lato, striato, sapore grato; sporis stramineis, globosis, echinulatis, 5–7 μ ; stipite albo, 5–6 \times 1.5–2 cm.

Pileus convex to deeply depressed, scattered, 6–8 cm. broad; surface glabrous, slightly viscid, peeling readily, striate to the disk in age, uniformly grass-green without variation; context rather thin, white, unchanging, odorless, mild; lamellae adnate, plane, medium broad, medium distant, equal, many forked at the base, entire, white; spores globose or subglobose, roughly echinulate, uninucleate, pale-stramineous in mass, 5–7 μ ; stipe subequal, lightly striate, glabrous, milk-white, about 5–6 \times 1.5–2 cm.

Type collected by West and Murrill under oaks in Prairie Creek Hammock, just south of Newnan's Lake, Florida, July 27, 1938 (*F 17942*). Many specimens were collected and the color was always the same. The spores are paler and smaller than those of *R. graminicolor* Quél., while too yellow to match those of *R. crustosa* Peck.

***Russula subluteobasis* sp. nov.**

Pileo convexo-depresso, 5 cm. lato, roseo cremeoque, sapore grato; sporis globosis, echinulatis, flavis, 10–12 μ ; stipite albo, 6 \times 1 cm.

Pileus convex to deeply depressed, solitary, 5 cm. broad; surface smooth, glabrous, roseous and cremeous, margin entire, slightly striate; context thin, white, unchanging, mild; lamellae adnate, plane, narrow, crowded, mostly equal, entire, flavous; spores globose, strongly and densely echinulate, deep-yellow in mass, 10–12 μ ; stipe equal, smooth, glabrous, white, unchanging, slightly yellow at the very base, 6 \times 1 cm.

Type collected by West, Arnold and Murrill on the ground in oak-pine woods at Magnesia Springs, Fla., July 15, 1938 (*F 17702*). The huge spores are very rough, and deep-yellow in mass.

***Russula subviridella* sp. nov.**

Pileo 4 cm. lato, aerugineo; sapore grato; sporis subglobosis, hyalinis, tuberculatis, 5–6 μ ; stipite albo, 3 \times 0.5 cm.

Pileus convex to deeply depressed, solitary, 4 cm. broad; surface dry, smooth, finely pulverulent to glabrous, midway between caesious and atrovirens, margin even, entire, pellicle separable; context white, unchanging, mild; lamellae adnate, white, unchanging, equal, narrow, crowded, entire; spores subglobose, tuberculate, hyaline, 5–6 μ ; stipe subequal, enlarged above, smooth, glabrous, white, solid, 3 \times 0.5 cm.

Type collected by W. A. Murrill in rich soil under *Sambucus* at Gaines-

ville, Fla., Sept. 30, 1932 (*F 9509*). As cup-shaped as a *Peziza* and at first suggesting *R. aeruginea*, but with smaller spores and not at all viscid.

***Russula uncialiformis* sp. nov.**

Pileo 4-5 cm. lato, subviscido, purpureo; sapore grato; sporis subglobosis, echinulatis, ochraceis, 6-8 μ ; stipite albo, 2.5-4 \times 0.6-0.8 cm.

Pileus convex to depressed, gregarious, 4-5 cm. broad; surface viscid when fresh, smooth, glabrous, purple, darker at the center, margin peeling, striate at times; context white, unchanging, taste mild; lamellae adnate, equal, with only a few inserted, rather narrow and crowded, entire, white to ochraceous; spores ochraceous in mass, subglobose, echinulate, 6-8 μ ; stipe equal, smooth, glabrous, white, 2.5-4 \times 0.6-0.8 cm.

Type collected by W. A. Murrill on a lawn under an oak at Gainesville, Fla., Nov. 7, 1932 (*F 9556*). Also collected several other times under oaks in and near Gainesville (*F 9557*, *F 15670*, *F 16086*, *F 16087*). This species has the form of *R. uncialis* but is purple, with ochraceous spores.

***Russula variicolor* sp. nov.**

Pileo 4 cm. lato, albo, viridi et purpureo; sapore grato; sporis globosis, tuberculatis, hyalinis, 7-8.5 μ ; stipite albo, 3 \times 1 cm.

Pileus convex to depressed, gregarious, about 4 cm. broad; surface dry, smooth, glabrous, white with pale-cremeous, greenish and purplish hues, cuticle separable, margin even; context white, mild; lamellae adnate, many furcate near the base, rather narrow and crowded, white; spores white in mass, globose, tuberculate, 7-8.5 μ ; stipe equal, smooth, dry, glabrous, white, about 3 \times 1 cm.

Type collected by W. A. Murrill on the ground under an oak in Gainesville, Fla., Oct. 3, 1932 (*F 9513*). Remarkable for its display of colors. Collected again near Gainesville in 1938.

***Russula vinosirosea* sp. nov.**

Pileo convexo-plano, 6 cm. lato, subviscido, striato, sapore grato; lamellis adnatis, angustibus, albis; sporis albis, ellipsoideis, tuberculatis, 5-7 μ ; stipite albo, glabro, 4-5 \times 1 cm.

Pileus convex to plane, gregarious, 6 cm. broad; surface slightly viscid, glabrous, uniformly roseous with a pale-vinose tint, margin concolorous, entire, not peeling, distinctly tuberculate-striate; context thin, firm, white, unchanging, mild, odorless; lamellae adnate, narrow, medium distant, white, unchanging, entire, many forked at or near the base; spores white, broadly ellipsoid, 1-guttulate, moderately rough, 5-7 μ long; cystidia none; stipe subequal, smooth, glabrous, white, unchanging, about 4-5 \times 1 cm.

Type collected by W. A. Murrill under a laurel oak in Sugarfoot, near Gainesville, Fla., June 26, 1942 (*F 18677*). Color very unusual. A poor spe-

cimen of what appears to be the same species was collected by Watson and Murrill in low ground at Camp O'Leno, Columbia Co., Fla., Dec. 14, 1941 (*F* 17456).

***Lepiota asperiformis* sp. nov.**

Pileo convexo, 3-5 cm. lato, roseo-isabellino, brunneo-tuberculato; lamellis albis; sporis ellipsoideis, glabris, subhyalinis, $6-7 \times 3.5\mu$; stipite albo, $4-6 \times 0.5-0.6$ cm.; annulo fibrilloso, albo.

Pileus convex, not umbonate, solitary to gregarious, 3-5 cm. broad; surface dry, uniformly subtomentose and rosy-isabelline with dark-brown conic warts, margin even, entire; lamellae free, narrow, crowded, some furcate, white, unchanging, edges denticulate; spores ellipsoid, rarely ovoid, smooth, subhyaline, $6-7 \times 3.5\mu$; stipe equal above the thickened base, smooth, glabrous, white, $4-6 \times 0.5-0.6$ cm.; veil a perfect cobweb pattern, medially attached, white, persistent.

Type collected by Erdman West and W. A. Murrill on the ground in woods at Gainesville, Florida, Nov. 3, 1932 (*F* 9703). Evidently very near *L. aspera* but much smaller and differing in certain other characters.

***Lepiota Humei* sp. nov.**

Pileo conico-expanso, umbonato, 5-8 cm. lato, albo, isabellino-squamuloso, striato; sporis $9 \times 6\mu$, stipite avellaneo, $6-8 \times 0.3-0.6$ cm.; annulo magno, albo.

Pileus conic to expanded-umbonate, gregarious, 5-8 cm. broad; surface dry, white, with pale-ochraceous-isabelline umbo and scales, margin entire, rimose with age, conspicuously striate for about 1.5 cm.; context thin, white, unchanging, odorless; lamellae free, rounded behind, medium broad, medium distant, inserted, overlapping with age, white, the edges finely fringed; spores ellipsoid, pure-white in mass, apiculate, uniguttulate, smooth, about $9 \times 6\mu$; stipe subequal above the small bulb, smooth glabrous, avellaneous, $6-8 \times 0.3-0.6$ cm.; annulus large, white, fixed, persistent, the edge double.

Type collected by Dr. Harold H. Hume and son in dry soil north of Payne's Prairie near Gainesville, Fla., July 29, 1938 (*F* 18056). Also collected by E. West on a pile of old cow dung at Grove Park, Fla., July 10, 1938 (*F* 18044). In October, 1928, and November, 1931, the author found this species growing in his vegetable garden (*F* 9656, *F* 9689).

***Lepiota mammillata* sp. nov.**

Pileo convexo, umbonato, 5-7.5 cm. lato, albo, centro isabellino; lamellis albis; sporis ellipsoideis, glabris, hyalinis, $11-12 \times 6-7\mu$; stipite albo, 7 cm. longo; annulo supero, amplo, albo.

Pileus convex with prominent umbo, gregarious, 5-7.5 cm. broad; sur-

face dry, pruinose, white, isabelline on the umbo, margin even to striate and scaly with age from the ruptured cuticle; context pallid, unchanging; lamellae free, rather broad and crowded, entire, white; spores ellipsoid, smooth, hyaline, uniguttulate, obliquely apiculate at the base, $11-12 \times 6-7\mu$; stipe tapering upward, rather slender, smooth, subglabrous, white, about 7 cm. long; annulus superior, fixed, ample, persistent, white.

Type collected by Erdman West in rich exposed soil at Gainesville, Fla., Nov. 8, 1932 (*F 9701*). A large, shapely species entirely white except on the prominent isabelline umbo.

***Lepiota roseiceps* sp. nov.**

Pileo vix 2 cm. lato, roseo; lamellis latis, albis; sporis ellipsoideis, hyaline, $6-7 \times 3.5-5\mu$; stipite bulboso, albo, 2.5 cm. longo; annulo infero, amplo, albo.

Pileus convex to plane or slightly depressed, gregarious, scarcely 2 cm. broad; surface smooth, subglabrous, roseous, margin even, entire; context white, unchanging; lamellae free, several furcate, rather broad and crowded, entire, white, unchanging; spores ellipsoid or ovoid, smooth, hyaline, $6-7 \times 3.5-5\mu$; stipe smooth, white, bulbous, about 2.5 cm. long; annulus inferior, ample, fixed, persistent, white.

Type collected by W. A. Murrill on the ground under a tree at Gainesville, Fla., Sept. 20, 1932 (*F 9687*). Collected several times since in the vicinity.

***Lepiota subfulvidisca* sp. nov.**

Pileo 2.5-4 cm. lato, albo, centro pallide-fulvo; sporis ellipsoideis, glabris, subhyalinis, $8.5-9.5 \times 6-7\mu$; stipite subalbo, 5-8 cm. longo; annulo supero, albo.

Pileus convex to expanded, solitary, 2.5-4 cm. broad; surface dry, smooth, glabrous, becoming hispid and striate with age, pure white, pale fulvous on the disk; context white, unchanging; lamellae free, broad, rather crowded, entire, unchanging; spores broadly ellipsoid, uniguttulate, smooth, hyaline with yellowish tint, $8.5-9.5 \times 6-7\mu$; stipe tapering upward, smooth, glabrous, sordid-whitish, about 5-8 cm. long, varying in thickness; annulus superior, fixed, persistent, white.

Type collected by W. A. Murrill on a lawn in Gainesville, Fla., Nov. 8, 1932 (*F 9670*). Also collected several other times on lawns in Gainesville.

***Lepiota subneophana* sp. nov.**

Pileo convexo, 3-3.5 cm. lato, glabro, rubro-fulvo; lamellis albis, fimbriatis, sporis ovoideis, $6 \times 3\mu$; stipite glabro, albo, $4 \times 0.3-0.5$ cm., annulo albo, amplo, persistente.

Pileus convex without umbo to hat-like with broad umbo, scattered, 3-3.5 cm. broad; surface smooth, finely pubescent, pale reddish-fulvous, darker

reddish-fulvous on the disk, margin even, entire, upturned in age; context thin, white, unchanging; lamellae free, ventricose, rather close and narrow, white, becoming slightly yellowish on drying, the edges becoming brownish with a white fringe; spores ovoid, smooth, hyaline, about $6 \times 3\mu$; stipe tapering upward, smooth, glabrous, white, becoming brownish on drying, $4 \times 0.3-0.5$ cm.; annulus median or lower, fixed, membranous, ample, white, unchanging, persistent.

Type collected by W. A. Murrill under a tung-oil tree in Gainesville, Fla., June 8, 1938 (*F* 17225). At maturity the cap is shaped like a farmer's hat with convex crown and upturned brim. The dried gills are almost white with brown edges decorated with white fringe.

***Lepiota subphaeosticta* sp. nov.**

Pileo plano, 5-10 mm. lato, albo, atro-squamuloso; sporis $5 \times 3\mu$, stipite clavato, albo, $1-1.5 \times 0.05-0.1$ cm.; annulo membrano, persistente.

Pileus campanulate to plane or slightly depressed, not umbonate, gregarious, 5-10 mm. broad; surface dry, white, decorated with minute blackish scales, which are denser on the disk; margin entire, even, slightly striate with age; context thin, white, unchanging; lamellae free, narrow behind, broad in front, inserted, rather crowded, entire, white, unchanging; spores ellipsoid or ovoid, smooth, hyaline, uniguttulate, obliquely apiculate, about $5 \times 3\mu$; stipe tapering upward from a clavate base, smooth, glabrous, white, unchanging, $1-1.5 \times 0.05-0.1$ cm.; annulus median, white, fixed, membranous, persistent.

Type collected by W. A. Murrill on a rotten hardwood log in woods at Gainesville, Fla., July 7, 1938 (*F* 17473). A tiny white species with a black eye. The spores are not oblong-ellipsoid, nor do they measure over 5μ in length.

***Lepiota subrepanda* sp. nov.**

Pileo 1-1.5 cm. lato, testaceo, centro lateritio; sporis late ellipsoideis, $5-6 \times 3.5-5\mu$; stipite albo, 4-5 cm. longo; annulo medio, amplo, persistente, albo, margine subrubro.

Pileus convex to plane, not umbonate, gregarious, 1-1.5 cm. broad; surface smooth, dry, minutely squamulose, testaceous, lateritious on the disk, margin even, entire; lamellae free, rather broad and crowded, entire, white, unchanging; spores broadly ellipsoid, smooth, hyaline, uniguttulate, $5-6 \times 3.5-5\mu$; stipe slender, subequal, smooth, glabrous, white, glistening, 4-5 cm. long; annulus median, ample, fixed, persistent, white with reddish margin.

Type collectd by Erdman West and W. A. Murrill on dead twigs and humus in oak woods at Gainesville, Fla., Nov. 9, 1932 (*F* 9667). Also collected in two other places the same day, both in oak woods (*F* 9671, *F* 9672).

***Lepiota subrhacodes* sp. nov.**

Pileo globoso ad subexpanso, 8-10 cm. lato, albo, isabellino-squamoso; sporis ovoideis, hyalinis, $7-8 \times 5\mu$; stipite avellaneo, bulboso, 9×1 cm., annulo magno, albo.

Pileus globose to subexpanded, gregarious, 8-10 cm. broad; surface dry, white, with isabelline scales and disk, becoming dark-isabelline on drying; context thick, firm, white, unchanging; lamellae free, broad, close, entire, white, brownish when dry; spores ovoid, smooth, hyaline, uniguttulate, obliquely apiculate, about $7-8 \times 5\mu$; stipe tapering upward from a bulbous base, smooth, glabrous, avellaneous, brownish when handled or in drying, $9 \times 0.8-1$ cm.; annulus superior, large, thick, white, becoming movable, the edge double and fringed.

Type collected by West and Murrill on the ground under oaks in a hammock at Hunter's Station, near Gainesville, Fla., July 26, 1938 (*F 18051*). Like *L. Morgani* but with white spores and a different habitat. In a day or two after drying the specimens were found changed throughout to dull-brown. The average Florida collector would most certainly mistake this species for *L. Morgani* and leave it where he found it. It is only after the gills fail to become green that one's suspicions are aroused.

***Lepiota tinctoria* sp. nov.**

Pileo convexo-expanso, caespitoso, 5-10 cm. lato, multisquamuloso, albo ad subcastaneo, subacrido; lamellis latis, albis; sporis $6-8 \times 5-6\mu$; stipite clavato, albo ad subcastaneo, $6-7 \times 0.5-1.5$ cm.; annulo amplo.

Pileus convex to expanded, often umbonate, cespitose, 5-10 cm. broad; surface dry, white, with numerous small reflexed pointed fibrillose pale-chestnut scales, becoming entirely pale-chestnut some time after drying; margin concolorous, mostly entire, becoming slightly striate; context thin, somewhat acrid at once, with pleasant odor, becoming luteous at once when cut, then darker; lamellae free, rounded behind, broad, ventricose, close, entire, white, luteous when cut, later dark-gray; spores ellipsoid or ovoid, smooth, 1-guttulate, purplish-hyaline, $6-8 \times 5-6\mu$; stipe clavate below, solid, dry, slightly fibrillose, white, luteous where bruised, pale-chestnut on drying, $6-7 \times 0.5-1.5$ cm.; annulus superior, ample, persistent, fixed, white, becoming pale-chestnut.

Type collected by W. A. Murrill on a shaded lawn in Gainesville, Fla., Sept. 11, 1942 (*F 19944*). Also collected in the vicinity by G. F. Weber and W. B. Tisdale. Closely related to *L. americana* but with much smaller scales. It stains the fingers yellow at once when handled. After some days in the herbarium the gills turn dark-gray while the rest of the hymenophore is pale-chestnut.

Lepiota truncicola sp. nov.

Pileo convexo, 2-3 cm. lato, praesquamuloso, isabellino, centro obscuriori; lamellis albis; sporis ellipsoideis, subhyalinis, glabris, $8.5-11 \times 6-8.5\mu$; stipite albo, 5-6 cm. longo; annulo supero, amplo, albo.

Pileus convex, not umbonate except in dried specimens, subcespitose, 2-3 cm. broad; surface dry, densely squamulose, isabelline, dull-smoky-isabelline on the disk, margin even, entire; context thin, pallid; lamellae free, broad, subdistant, subentire, white; spores smooth, subhyaline, broadly ellipsoid, $8.5-11 \times 6-8.5\mu$; stipe tapering upward, rather slender, smooth, subglabrous, white, about 5-6 cm. long; annulus superior, fixed, ample, persistent, white.

Type collected by Erdman West and W. A. Murrill on an oak log in woods at Gainesville, Fla., Nov. 9, 1932 (*F 9681*). In dried specimens the gills are brownish with the edges white and finally fimbriate. The spores, even under the microscope, have a decided yellowish-brown tint. (Near *L. subdryophila*.)

Lepiota Westii sp. nov.

Pileo 1.5-2.5 cm. lato, albo, castaneo-squamuloso, centro castaneo; sporis ellipsoideis, subhyalinis, $6-7 \times 3.5-4.5\mu$; stipite albo, 6-10 cm. longo; annulo supero, amplo, albo, persistente.

Pileus convex to expanded, gregarious, 1.5-2.5 cm. broad; surface dry, white, with castaneous scales and castaneous center, margin even, entire; context white, taste mild; lamellae white, unchanging, free, rather narrow and crowded, entire; spores ellipsoid, tapering at one end, smooth, uniguttulate, hyaline with yellowish tint, $6-7 \times 3.5-4.5\mu$; stipe slender, tapering upward, smooth, subglabrous, white, 6-10 cm. long; annulus fixed above the middle, ample, persistent, white.

Type collected by Erdman West and W. A. Murrill on the ground in oak woods at Gainesville, Fla., Nov. 9, 1932 (*F 9678*). Also collected in mixed woods (*F 9676*).

Boletinus floridanus sp. nov.

Pileo convexo, 6 cm. lato, flavo-roseo-isabellino, sublepideo, appendiculato, grato; tubulis $2-3 \times 1-2$ mm., subflavis ad brunneoflavis; sporis oblongis, hyalinis, $7-8 \times 3-4\mu$; stipite tomentoso, ochraceo, 3×1 cm., annulo albedo, parvo.

Pileus convex to nearly plane, 6 cm. broad; surface moist, uniformly pale yellowish-rosy-isabelline with small rosy-isabelline tufts of scales, margin acute, fertile, even, entire, appendiculate; context toughish, yellow, sweet, with pungent odor, about 5 mm. thick; tubes plane, slightly decurrent, 2-3 mm. long, 1-2 mm. broad, thin-walled, regular, pale-yellowish to dirty-brownish-yellow; spores oblong-ellipsoid, smooth, hyaline under

the microscope, about $7-8 \times 3-4\mu$; stipe solid, subequal, dry, tomentose, ochraceous, paler above, about 3×1 cm.; veil whitish, forming a slight annulus at the middle of the stipe.

Type collected by W. A. Murrill on a bank by a flatwoods pond under slash pine near Melrose, in Alachua Co., Fla., July 14, 1940 (*F* 19479). Two hymenophores, one normally developed and the other depauperate, were found near together. The species must be very rare.

***Ceratomyces cyaneitinctus* sp. nov.**

Pileo convexo, 4 cm. lato, castaneo; tubulis citrinis, sporis $12 \times 4\mu$; stipite flavo, 4×0.7 cm.

Pileus broadly convex, not fully expanding, solitary, 4 cm. broad; surface dry, finely tomentose, castaneous, margin even, undulate; context 5 mm. thick, mild, immediately becoming cyaneous when cut; tubes plane, elongate and slightly depressed at the stipe, about 6 mm. long and 2 to a mm., angular, entire, citrinous to melleous, changing at once to cyaneous when cut; spores fusiform, uniguttulate, smooth, yellowish-brown, about $12 \times 4\mu$; stipe equal, smooth, furfuraceous, citrinous above, flavous below, cyaneous where handled, 4×0.7 cm.

Type collected by West and Murrill on moist, shaded ground in Kelley's Hammock, ten miles northwest of Gainesville, Fla., August 3, 1938 (*F* 17986). Remarkable for the sudden change of color following exposure of tissues to the air.

***Gyroporus fumosiceps* sp. nov.**

Pileo convexo-plano, 8 cm. lato, fumosi, sapore grato; tubulis subalbis, parvis, sporis hyalinis, $11 \times 3\mu$; stipite subconcolori, reticulato, 3×2.5 cm.

Pileus convex to plane, solitary, 8 cm. broad; surface smooth, shining, glabrous, uniformly fumous, margin even, entire; context thick, white, becoming very slightly discolored when cut, sweet and nutty; tubes dirty-white, unchanging, brownish when dry, small, slightly depressed about the stipe, reaching 1 cm. in length; spores sausage-shaped, smooth, hyaline, about $11 \times 3\mu$; stipe strongly tapering downward, radicate, reticulate, subconcolorous, 3×2.5 cm.

Type collected by W. A. Murrill in grass under an oak at Gainesville, Fla., July 7, 1938 (*F* 17470). Readily recognized by its shining, smoke-colored surface; white, sweet flesh; and short, reticulate stem. The flavor is that of *B. edulis*.

***Gyroporus praeanisatus* sp. nov.**

Pileo caespitoso, 7-9 cm. lato, subtomentoso, umbrino ad fuligineo, anisato, felleo; sporis albis, $9-11 \times 2.5\mu$; stipite albo, $4-6 \times 2-3$ cm.

Pileus convex to expanded, usually cespitose, 7-9 cm. broad; surface

dry, coarsely rugose, subtomentose, umbrinous to fuliginous, margin even, entire to undulate; context thick, white, unchanging, with strong anise odor, very sweet but promptly becoming decidedly bitter; hymenium depressed about the stipe, white to pale-pink, becoming bright ferruginous-flavous and at length brownish where bruised; tubes not stuffed, long, 1 to a mm.; spores perfectly hyaline, straight or slightly curved, elongate, cylindrical, smooth, $9-11 \times 2.5 \mu$; stipe usually tapering toward the base, smooth, glabrous, white, changing like the tubes when bruised, $4-6 \times 2-3$ cm.

Type collected by W. A. Murrill in deep sand under and near laurel oak at the edge of a high hammock in Gainesville, Fla., June 19, 1939 (*F 19733*). Quite readily recognized by its cespitose habit, strong fragrance, and decidedly bitter taste. The spores are white in mass.

Gyroporus Woodiae sp. nov.

Pileo convexo, 8 cm. lato, glabro, albo, grato, anisato; tubulis 8 mm. longis, pallidis ad isabellinis, parvis; sporis hyalinis, $11-13 \times 2.5-3 \mu$; stipite albo, glabro, 6×3 cm.

Pileus convex, solitary, 8 cm. broad, 3 cm. thick: surface smooth, glabrous, not viscid, milk-white, unchanging, margin obtuse, fertile, entire; context soft, up to 2 cm. thick, white, unchanging, taste mild to very slightly astringent, odor strong of anise; hymenium plane, adnate to slightly depressed about the stipe, tubes 8 mm. long, pallid to isabelline, becoming slightly brownish-discolored when bruised, mouths thin-walled, angular, 2-3 to a mm.; spores sausage-shaped, smooth, hyaline with a slight ochraceous tint, $11-13 \times 2.5-3 \mu$; stipe equal, crooked, milk-white, unchanging, smooth, glabrous, solid, soft and white within, unchanging when cut, 6×3 cm.

Type collected by Miss Harriet B. Wood and W. A. Murrill in hammock woods at the Devil's Millhopper, near Gainesville, Fla., Sept. 20, 1941 (*F 18646*). An unusual species because of its milk-white cap and stem and very juicy white flesh. Probably an excellent edible species. It is closely related to *G. stramineus* Murrill.

Suillellus pictiformis sp. nov.

Pileo convexo, stuposo, castaneo, 4-6 cm. lato; tubulis 1 per mm., melleis, sporis $10-12 \times 4-5 \mu$; stipite stuposo, $6-8 \times 1-1.3$ cm.

Pileus convex, solitary, 4-6 cm. broad; surface densely shaggy-tomentose, castaneous; context citrinous, changing at once to cyaneous, taste acid; hymenium plane, tubes 1 per mm., melleous, changing at once to cyaneous, edges entire, red; spores oblong-ellipsoid, smaller at one end, smooth, granular, yellowish-brown, about $10-12 \times 4-5 \mu$; stipe enlarged upward, very shaggy, lateritious above, castaneous below, sulfureous at the apex, $6-8 \times 1-1.3$ cm.

First collected by West, Arnold and Murrill on the ground in Planera Hammock, eleven miles northwest of Gainesville, Fla., July 16, 1938 (*F 17862*). The specimen was somewhat old but still showed the flesh and tubes in good condition. I first thought of *Boletinus pictus* but soon changed my mind. The shaggy cap and stem seem quite out of place with red tube-mouths. Two other collections have since been made in the vicinity, the type (*F 18003*) in Kelley's Hammock, ten miles northwest of Gainesville on August 3, 1938, by West and Murrill. It is evidently rare.

***Grifola cristatiformis* sp. nov.**

Pileo convexo vel depresso, irregulari, 7-10 cm. lato, glabro, melleo; tubulis decurrentibus, fulvis, 5×2 mm.; sporis hyalinis, $4-6 \times 3-4\mu$; stipite glabro, fulvo, $2-3 \times 1.5-3$ cm.

Pileus circular to dimidiate, convex to depressed, solitary or gregarious to cespitose, 7-10 cm. or more broad; surface glabrous, uniformly ochroleucous to melleous, margin even, fertile, usually lobed and irregular at maturity; context soft, tough, cremeous, about 1 cm. thick, pale-umbrinous next to the tubes, which are decurrent, about 5 mm. long and 2 per mm., pale-fulvous within, mouths grayish-ocher to isabelline-avellaneous, at length fulvous, irregular with age; spores subglobose to broadly ovoid or ellipsoid, smooth, hyaline, 1-guttulate, $4-6 \times 3-4\mu$; stipe more or less central when solitary, eccentric or lateral when clustered, concolorous, glabrous, often with a short black rootlike projection, $2-3 \times 1.5-3$ cm.

Type collected by W. A. Murrill at Seven-Mile Church, west of Gainesville, Fla., in humus in moist, dense woods of red oak, hickory, dogwood, etc., Dec. 11, 1941 (*F 21494*). Also collected by E. West at Newnan's Lake, near Gainesville, Nov. 11, 1938 (*F 18400*), and by W. A. Murrill in red-oak woods at Planera Hammock, northwest of Gainesville, Dec. 10, 1941 (*F 21492*). This species sometimes appears in abundance. It resembles *G. cristatus* above but is very different beneath.

***Scutiger Tisdalei* sp. nov.**

Pileo undulato, 12-14 cm. lato, avellaneo; tubulis brevibus, albis, 2 per mm.; sporis ovoideis, $5 \times 3\mu$; stipite avellaneo, 4×4 cm.

Pileus subcircular, nearly plane, about 12-14 cm. broad; surface uneven, short-pubescent to glabrous, uniformly avellaneous, margin undulate to lobed, sterile; context cheesy to spongy, firm next to the tubes, white with avellaneous zones, 2-3 cm. thick; hymenium rather uneven, subdecurrent, tubes rather irregular, thick-walled, about 2 per mm., short, white discolored when bruised, stramineous when dry; spores ellipsoid, smooth, 1-guttulate, about $5 \times 3\mu$; stipe central, concolorous, woody, about 4×4 cm.

Type collected by Dr. W. B. Tisdale on shaded leaf-mulch in Gainesville,

Fla., July 20, 1942 (*F 19185*). Containing considerable water when fresh but drying readily in an electric oven, when it becomes light and spongy, the surface retaining its original color.

***Tyromyces Tigertianus* sp. nov.**

Pileo convexo-plano, flabelliformi, $9 \times 8 \times 3$ cm., glabro, albo, grato, anisato; tubulis albis, 1 cm. longis, 2-3 per mm., sporis ovoideis vel ellipsoideis, $4 \times 2.5-3\mu$.

Pileus convex-plane, flabelliform, attenuate, sessile, $9 \times 8 \times 3$ cm.; surface smooth, glabrous, not encrusted, dull-white, pale-chestnut where bruised; margin thick, obtuse, even, entire; context fleshy-tough, distinctly zonate, isabelline, unchanging, about 2 cm. thick, taste very sweet and nutty, odor strong of anise; hymenium plane, glistening, watery-white, brownish where bruised, tubes pallid within, about 1 cm. long, mouths entire, becoming thin-walled, subcircular to oblong or daedaleoid, 2-3 to a mm.; spores ovoid or broadly ellipsoid, smooth, hyaline, with one large gutta, about $4 \times 2.5-3\mu$.

Type collected by W. A. Murrill on a decayed spot at the base of a living red maple in a low hammock west of Penney Farms, Clay Co., Fla., Oct. 12, 1941 (*F 21541*). The base of the pileus was old and black when found. The mycelium probably causes a butt-rot. The species is named in honor of Dr. John J. Tigert, President of the University of Florida.

New Combinations

For those using Saccardo's nomenclature the following new combinations are made:

<i>Ceromyces cyaneitinctus</i>	= <i>Boletus cyaneitinctus</i>	✓
<i>Grifola cristatiformis</i>	= <i>Polyporus cristatiformis</i>	✓
<i>Gyroporus fumosiceps</i>	= <i>Boletus fumosiceps</i>	✓
<i>Gyroporus praeanisatus</i>	= <i>Boletus praeanisatus</i>	✓
<i>Gyroporus Woodiae</i>	= <i>Boletus Woodiae</i>	✓
<i>Scutigera Tisdalei</i>	= <i>Polyporus Tisdalei</i>	✓
<i>Suillellus pictiformis</i>	= <i>Boletus pictiformis</i>	✓
<i>Tyromyces Tigertianus</i>	= <i>Polyporus Tigertianus</i>	✓